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RICE: ANALYTICAL BASE AND POLICY ISSUES

Warren R. Grant
Shelby H. Holder, Jr.
Milton H. Ericksen

December 1980

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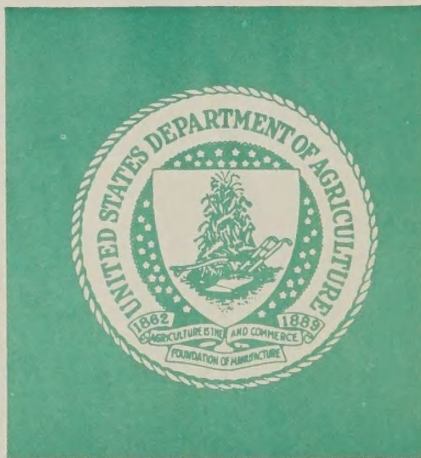


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RICE: ANALYTICAL BASE AND POLICY ISSUES. By Warren R. Grant, Shelby H. Holder, Jr. and Milton H. Ericksen, National Economics Division, Economics and Statistics Service, U.S. Department of Agriculture, Washington, D.C. 20250, ESS Staff Report, December 1980.

ABSTRACT

Current rice agricultural policy, evolving out of several programs, provides price and income support through the 1981 crop year. As the time approaches for consideration to renew, amend, or replace that legislation, several policy issues important to the rice industry arise. This report reviews the historical and current rice policy and discusses those issues that have arisen.

Key words: Rice, rice policy, government policy, rice programs.

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PREFACE

The Food and Agriculture Act of 1977 will expire in 1981. The new legislation will become the Nation's masterplan for agriculture until 1985. It could well influence the organization and operation of the food system for many years.

Along with the traditional concern over price and income policy, several new issues have emerged since 1977. Of particular significance are such matters as inflation, energy, credit, conservation of our resource base, the increasing international role of U.S. agriculture, and the design and implementation of both domestic and international food assistance programs.

This report is a product of the ESS research agenda for the 1981 food and agriculture bill. It focuses on rice. Like wheat, feed grains and cotton rice has a similar history of policies and programs. Legislative changes in 1975 brought the rice program provisions in close association with the wheat, feed grain and cotton programs. The 1977 Act, which included rice as Title VII, continued the trend to parallel provisions. This report provides a complete production, marketing, and program history background for rice to go along with identification and discussion of rice issues that will be important in the 1981 legislative effort.

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HIGHLIGHTS

Current rice agricultural policy evolved out of several programs designed to provide producers price and income support. Currently, the basic thrust is a market-oriented policy. Nonrecourse loan and farmer-held reserve programs are the first line of defense against price depressing effects of excess rice supplies. Allotment producers can place rice in the nonrecourse loan program to help overcome seasonal price depression or in the farmer-held reserve loan program if the price depression is longer than one season. These producers can sell rice held in the reserve program when crops and production are less favorable and prices reach 140 percent above the loan rate. Set-aside and diversion programs are the second line of defense. Target prices are the third line of defense and provide income safety that does not disturb market operations. Not all segments of the current rice program are functioning in a manner consistent with the above objectives. Some problem areas that likely will be policy issues for 1981 legislation are:

Rice Reserve Program

- Producers have no experience in speculating with carryover stock.
- Current loan rate may be too low to stimulate use of reserve program.
- Secretary has limited flexibility in adjusting loan rate.
- Loan rate changed by same percentage adjustment as the target price.
- Release and call prices are keys to reserve program effectiveness.
- Program available only to allotment holders.

Rice Allotments

- Rice allotments were only 60 percent of 1979 rice acreage.
- Rice allotments not uniformly distributed among current producers.
- Current planted acre basis for allotments would overcome some of the problems of a historical allotment; however, it creates a problem of how to equitably appease the producers holding the historical allotments.
- With current planted acres basis and the same level of program benefits, Government costs are higher.

Set-Aside-Diversion Program

- Limited to allotment holders.
- Problems brought on by historical allotments.
- Would not be very effective in encouraging acreage reductions of rice.

Payment Limitation

- Payment limitation for rice, wheat, feed grains, and upland cotton combined at \$50,000 in 1980 and 1981.
- Inflation may cause pressure to raise this level.

Five-Month Market Price

- Five-month weighted average market price part of formula for determining deficiency payment.
- About 55 percent of 1979 rice production is marketed by cooperatives on a pool concept, making it difficult to determine a market price for "coop rice" until their entire supply is sold.
- Question of how to handle green rice sales in determining market price, target price, and loan rate.
- Current rice market sampled to determine five-month market price is a limited portion of total market.

Rice in International Diplomacy

- Rice has long been used in international diplomacy, such as P.L. 480 trade to support favored nations.
- Trade interrupted with Iran and Russia during 1979/80 marketing year.
- Should one segment of the economy bear the brunt of a policy designed for the benefit of the country as a whole?
- Should a preplanned backup policy be used when trade suspensions are used?

RICE: ANALYTICAL BASE AND POLICY ISSUES

Warren R. Grant, Shelby H. Holder, Jr., and Milton H. Ericksen*

INTRODUCTION

Rice is the primary food for over one-half of the world's population. The culture of the crop predates written history. Rice probably was first grown in India around 3,000 B.C., and its culture has since spread to most countries of the world. U.S. rice production began on a commercial basis in the late 17th century, and the grain is now a major crop.

The area planted to rice in 1977 was less than 1 percent of U.S. cropland acreage, but rice ranked sixth in production value of major field crops. Rice produced in the United States accounted for nearly one-fourth of all rice in international trade in calendar year 1979, but for only 1.7 percent of world production. U.S. rice is distributed to all 50 States and over 100 countries.

Rice has been covered by the basic price and income support programs that have been in place for U.S. crops since the 1930's. Starting in the early sixties, the wheat, feed grain, and cotton programs went through a transition to a dual price and income support system. A similar change was made with the Rice Production Act of 1975, beginning with the 1976 crop. The 1977 Act continued the price support-target price system for wheat, feed grains, cotton, and rice.

As the 1981 legislation year approaches, policymakers will again deliberate rice program issues. The purpose of this report is to develop a thorough background paper on rice to provide decisionmakers with an economic and information base for formulating rice policy.

U.S. PRODUCTION

Rice allotments were apportioned to 11 States in 1980. Five of these States--Arkansas, California, Louisiana, Mississippi, and Texas--have more than 98 percent of the total U.S. rice production. U.S. rice is grown under flood irrigation. Most operations are highly mechanized and require high capital investment in irrigation facilities and farm machinery.

*Grant and Holder are agricultural economists, and Ericksen is chief of the Crops Branch with the National Economics Division, Economics and Statistics Service, U.S. Department of Agriculture, stationed at the Department of Agricultural Economics, Texas A&M University, the Department of Agricultural Economics, University of Arkansas, and Washington, D. C., respectively.

Rice Producing Areas

There are six major producing areas in the United States: The Grand Prairie and Northeast areas of Arkansas, the Mississippi River Delta, Southwest Louisiana, the Coast Prairie of Texas, and the Sacramento Valley of California (figure 1). Combined, these six areas produce about 95 percent of the total U.S. rice crop.

There are two key physical requirements for growing rice in the United States: (1) land surface slope should be relatively flat to control irrigation water, and (2) internal drainage should be poor to hold surface water in flood condition. Land meeting these requirements is further restrained by available irrigation water and practical crop rotations. These physical limitations have restrained expansion in some areas.

Probable production from potential expansion far exceeds domestic needs and current large exports. Thus, the key factor in expansion hinges heavily on the export market and the effect on prices. Substantial acreage expansion would require major structural adjustments in rice-related industries in some areas. Major increases in rice acreage would require large inputs of water, machinery, fertilizer, and chemicals, and increased facilities for drying, storing, and milling. Any contraction in rice acreage once these investments are made becomes costly to producers and processors geared to a larger rice volume.

Rice farms in the older rice-growing areas include 14.2 million acres of cropland (table 1). Soil texture and surface slope on 10.1 million of these acres are well suited to rice production. Overall, available water supplies and practical rotation programs restrict potential rice acreage to about 5 million acres annually. This is 1.9 million acres more than the 3.1 million acres planted in 1979. About three-fourths of the remaining expansion possibility is in the Mississippi River Delta. Untapped potential in southwest Louisiana is in competition with industrial and urban uses which are rapidly encroaching on land and water supplies available for agricultural use.

Physical characteristics of each major rice area have been described in earlier reports. ^{1/} The following sections comment on the extent of these areas and on particular conditions that have implications for expanding rice acreage. The potential of new areas adjacent to established ones is not considered.

^{1/} Troy Mullins, Warren R. Grant, J. R. Campbell, Arthur Gerlow, C. A. Bonnen, and D. E. Welsch, Resource Use Adjustment in Southern Rice Areas; Part I, Effects of Price Changes with Unrestricted Rice Acreages, Bul. 122, So. Cooperative Ser., June 1967. Troy Mullins, J. Bruce Hottel, J. R. Campbell, Arthur R. Gerlow, Warren R. Grant, and D. E. Welsch, Resource Use Adjustments in Southern Rice Areas; Part II, Effects of Price Changes with Selected Rice Allotment Levels, Bul. 131, So. Cooperative Ser., May 1968. Troy Mullins, Willard F. Woolf, Arthur R. Gerlow, J. Bruce Hottel, Warren R. Grant, and Stanley S. Johnson, Resource Use Adjustments in Major U.S. Rice Areas; Part III, Tenure, Supply, Demand, Bul. 160, So. Cooperative Ser., Feb. 1971.

FIGURE 1. MAJOR U.S. RICE AREAS

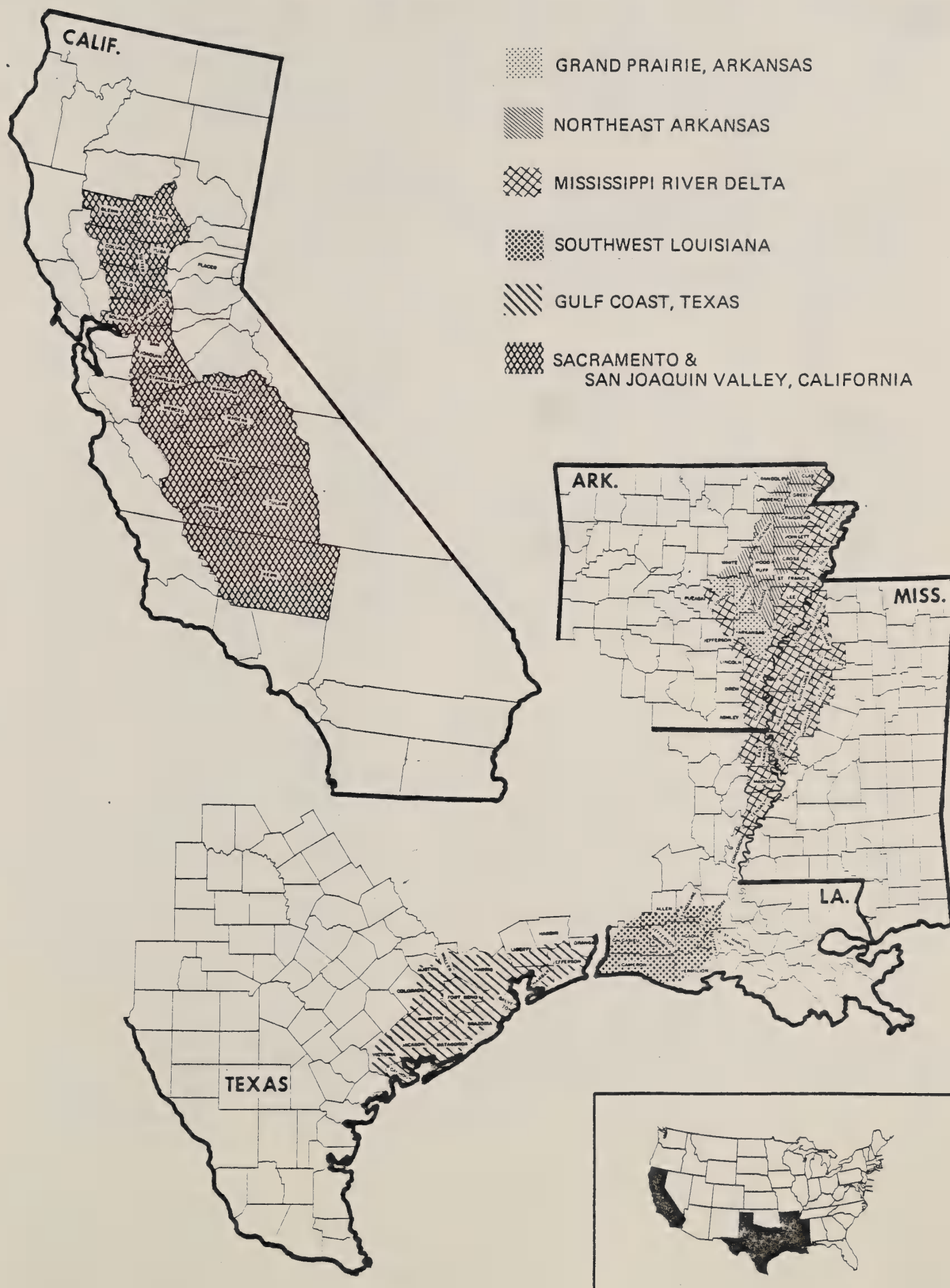


Table 1--Estimated acreage of cropland, acreage suited to rice, potential acreage annually, and acreage harvested, major U.S. rice areas, 1973 and 1976-79

Area	Cropland 1/			Acreage harvested 2/				
	Total	Suited to rice	Potential rice acreage 3/	1973	1976	1977	1978	1979
				1,000 acres				
Grand Prairie, Arkansas	533	431	200	263	215	218	255	242
Northeast Arkansas	1,806	1,355	668	200	454	462	625	595
Mississippi River Delta	6,888	3,418	2,112	178	400	337	545	618
Southwest Louisiana	1,794	1,794	897	597	504	432	515	460
Coast Prairie, Texas	2,550	2,430	596	531	508	502	560	560
Sacramento Valley,								
California 4/	661	661	503	401	399	310	493	525
Total traditional	14,232	10,069	4,976	2,170	2,480	2,260	2,993	3,000
Non traditional	--	340	200	--	--	--	--	--
Total potential	14,232	10,409	5,176	2,170	2,480	2,260	2,993	3,000

-- = No estimate available.

1/ Warren R. Grant and Shelby H. Holder, Jr., "Recent Changes and the Potential for U.S. Rice Acreage," Rice Situation, Econ. Res. Serv., U.S. Dept. Agr., RS-26, Oct. 1975; Harlon D. Traylor, Bobby J. Miller and Lewis C. Hill, "The Potential for Rice Production in Northeast Louisiana," The Louisiana Rural Economist for 1976, Dept. of Agr. Econ. and Agribus., Louisiana State Univ., Baton Rouge, La.; and Troy Mullins, Rice Production in Non-traditional Areas, ESCS, USDA, Ag. Eco., Rep. No. 423, April 1979.

2/ Total harvested acreage based on Econ. Stat. and Coop. Serv., U.S. Dept. Agr. data. Year refers to crop year August 1 to July 31.

3/ Approximate acreage that could be grown annually after taking into account limitations imposed by available water for irrigation and/or agronomic factors associated with rotations. These estimates were made in the mid-sixties, but have been adjusted for known changes that have occurred since then. The Delta includes estimates for land currently in noncropland that would need clearing before use as rice land. This land (667,000 acres) is in Northeast Louisiana.

4/ Excludes the San Joaquin Valley which is about 10 percent of the total.

Grand Prairie, Arkansas

The Grand Prairie of Arkansas is located in east-central Arkansas and includes portions of Arkansas, Lonoke, and Prairie counties. It is characterized by broad expanses of level to gently sloping land comprised largely of loessial terrace soils with an impervious clay subsoil 12 to 18 inches below the surface. Internal drainage is generally poor, and the soils are only moderately fertile.

Grand Prairie has an estimated 533,000 acres of cropland, but only 431,000 acres are suitable for rice production (table 1). Total water supplies can sustain only about 200,000 acres of rice over a long period because serious drawdowns occur in the underground water supply when larger acreages are planted. Acreage was above the estimated long-term potential during 1976-79; however, any sustained acreage at that level will adversely affect irrigation water supplies.

Northeast Arkansas

Northeast Arkansas, located between Crowley's Ridge on the east and the White and Black Rivers to the southwest and west, includes parts of 15 counties. A much wider range of soil conditions occurs here than in the Grand Prairie. Rice is grown on loessial terrace soils, or on clay or mixed alluvial bottomland soils. Irrigation water is supplied mainly from underground strata from depths of 50 to 75 feet. No serious drawdown of the underground water level has been observed except in the extreme eastern side of the area. An estimated 668,000 acres of rice, or 50 percent of the cropland suited for production, could be sustained. Northeast Arkansas could expand about 73,000 acres above the 1979 level and still maintain practical rotations, since additional water is available for shortrun expansion above this level.

Mississippi River Delta

The Mississippi River Delta is the most extensive major rice-growing area. It includes all or parts of 43 counties in southeast Arkansas, northeast Louisiana, Mississippi, and southeast Missouri. Rice acreage is scattered throughout the Delta, but is concentrated in southeast Arkansas and the central Delta counties of Mississippi. Total Delta cropland suited for rice production is estimated at 6.9 million acres. About 3.4 million acres, comprised of clay and mixed soil with impervious subsoils, are suited for rice. Recent expansion has occurred principally on these soils. An additional 800,000 acres of noncropland could be brought into rice production fairly rapidly.

Irrigation water is supplied from shallow underground strata and from surface streams. Water supplies could irrigate much larger acreages in the Delta, but agronomic restrictions impose practical limits on potential acreage to about 2.1 million acres annually. An estimated 613,000 acres were planted in 1979.

Southwest Louisiana

The southwest Louisiana rice area comprises 2.2 million acres of cropland in the eight parishes in the southwestern area. Some 1.8 million of these acres are physically suited for producing rice, with soil characteristics ranging from fine-textured, poorly drained clay soils near marsh areas along the coast to coarser textured, moderately well drained soils along the northern and eastern fringes of the area.

Irrigation water is split about evenly between surface and groundwater. Hydrological studies indicate groundwater levels are relatively static, but saltwater intrusion causes some problem with surface water in drought periods. Irrigation water exists in sufficient quantities, but agronomic restrictions will hold maximum total potential annual rice acreage to about 900,000 acres.

Coast Prairie, Texas

The Coast Prairie of Texas, located along the eastern gulf coast, encompasses all or parts of 17 counties. Soils in this area are comprised of dark clay, clay loams, light loams, and sandy loams. The clay soils are found near coast marshes, while the light and sandy soils are north and west of the heavier soils. Water for 60 percent of the rice acreage is supplied from irrigation canals, and the balance from wells. Over 95 percent of the total cropland is suited to rice. Water availability limits acreage, however, and only about a fourth of the cropland, or 600,000 acres, could be sustained over long periods. The area is operating near its maximum potential because industrial and urban users are drawing heavily on the water supply.

Sacramento Valley, California

The Sacramento Valley of California includes parts of eight counties in the northern part of the large Central Interior Valley. Potential rice producers have about 660,000 acres of cropland, all suited to rice. Most rice is grown on alluvial clay and clay adobe soils. Rotation restrictions are not as limiting as in other rice areas. Rice producers not supplied by irrigation districts pump water from streams, drainage canals, and irrigation wells. Estimated long-term potential for rice in the Sacramento Valley, a little over 500,000 acres, represents three-fourths of the cropland. An estimated 522,000 acres were harvested in California in 1979. Drought in 1976 and 1977 limited the available irrigation water and reduced rice to 310,000 acres in 1977.

About 10 percent of the total California crop is produced in the San Joaquin Valley; however, potential rice acreage estimates are not available for this area.

Nontraditional Rice Areas 2/

About 340,000 acres of land in the Florida Everglades, Louisiana River parishes, and Puerto Rico are well suited for rice production (figure 2). If the areas were fully developed, approximately 200,000 acres could produce a crop annually, with 30,000 to 40,000 acres in Puerto Rico producing two crops. The acreage most likely to be developed would depend on farm prices. It ranges between 90,000 and 160,000 acres, with crops of 5 to 9 million hundredweight of rice. The impact of this production on supplies of and prices received for U.S. rice would be comparatively minor.

Importance of Rice as a Farm Enterprise

The production of rice geographically is much more restricted than most other field crops. It is grown under flood irrigation and nearly all operations are highly mechanized. A high capital investment is required for irrigation equipment and farm machinery.

Farm Structure

Rice farms are large compared with other crop-production units within the same areas. Rice was grown on an estimated 9,600 farms in 1974, with the average rice acreage on these farms ranging from 358 to 394 acres in Texas, California, and Mississippi, and 133 to 222 acres in Missouri, Arkansas, and Louisiana (table 2). No data is available on the number of rice farms in 1979, but it is expected that their number has increased. The 1979 rice cost of production survey gives information on the relative size, makeup, and tenure of rice farms by areas (table 3). The survey was designed to obtain per acre production costs by areas, which biases farm size toward large farms. Rice farms in Southwest Louisiana, Northeast Arkansas, and Grand Prairie Arkansas are relatively small compared to rice farms in the other areas. Surveyed rice farms in the Mississippi River Delta averaged 2,743 acres of cropland, the largest for any area.

Ownership of cropland operated in 1979 varied from a low of 29 percent in Southwest Louisiana to a high of 74 percent in the Mississippi River Delta. Ownership was relatively high in California at 64 percent of the cropland operated. All the other areas were less than half in cropland ownership.

Rice is rotated with other crops on farms where it is produced; however, it is the principal enterprise in terms of income on the farms reporting its production. In 1979, rice acreage to cropland acreage on rice farms ranged from 27 percent in the Delta to 53 percent in California (table 3). Soybeans is the main alternative crop in all the rice areas except California, where wheat prevails.

2/ Abstracted from the following report: Mullins, Troy, Rice Production in Nontraditional Areas, ESCS, USDA, AER No. 423, April 1979.

Figure 8.

Nontraditional Rice Areas

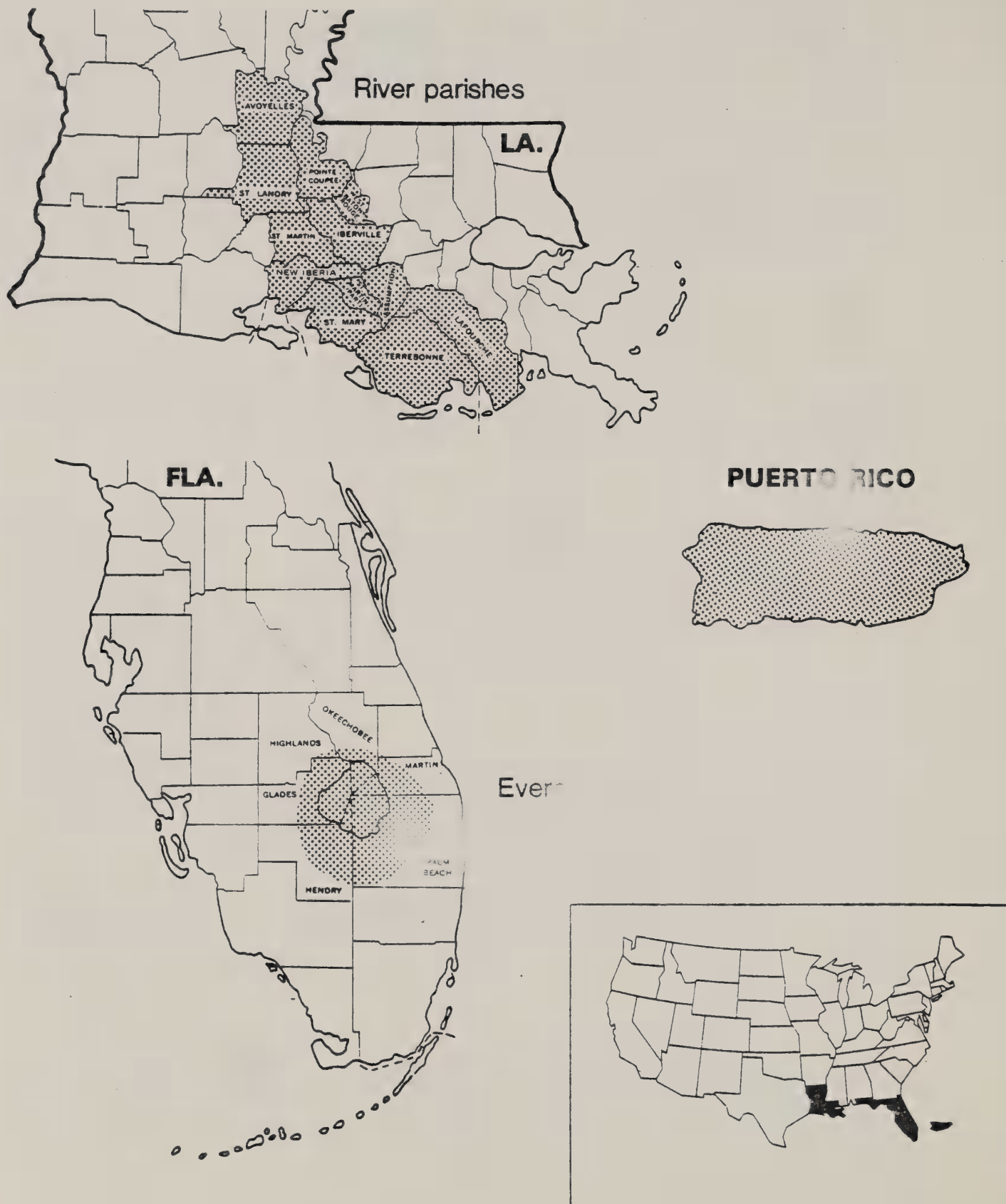


Table 2--Estimated number of rice farms and average rice acreage per farm, 1973-74

State and region	1973		1974	
	Farms <u>1/</u>	Acres <u>2/</u>	Farms <u>3/</u>	Acres <u>2/</u>
	<u>Number</u>			
Arkansas	3,344	159	3,450	209
Louisiana	2,959	210	3,035	222
Mississippi	207	300	281	394
Missouri	42	125	52	133
Texas	1,504	365	1,574	358
Southern States	8,056	220	8,392	247
California	1,129	355	1,220	377
United States	9,185	236	9,612	264

1/ Farms reported in Census of Agriculture.

2/ Calculated by dividing total acres harvested by number of farms reported.

3/ Derived by adding the estimated number of zero allotment farms growing rice in 1974 to number of farms shown for 1973.

Planting within the historical allotment is largest in the areas where little rice acreage expansion has occurred (table 4). Southwest Louisiana and both Texas areas contrast marked with the other regions. Most recent rice acreage expansion occurred in the Delta and Northeast Arkansas areas, where in 1979, 41 and 21 percent of the total rice acreage in those two areas was on farms with no allotment. Less than half the total rice acreage in those two areas was eligible for any Government program.

Leasing land to grow rice is a predominant practice in all areas except the Delta (table 5). In 1979, 50 percent of the rice was grown on owned land in the Delta. The other areas ranged from 13-percent owned in the Upper Counties of Texas to 45-percent owned in California. Of the land rented, payment for the land with a share of the crop is most prevalent. However, cash renting of land has made inroads in the Delta and both Texas areas. Of the share rental arrangement for rice land, the half arrangement dominates in the Grand Prairie, Delta, and both Texas areas (table 6). The fourth share rental arrangement is prevalent in Northeast Arkansas, while the third share arrangement is prevalent in California. The fifth is prevalent in Southwest Louisiana.

Table 3--Cropland on average rice farms, 1979 1/

Item	California :		Texas :		Mississippi :		Arkansas :	
	Upper counties :	Lower counties :	Southwest Louisiana :	River Delta :	Northwest Prairie :	North Prairie :	Grand Prairie :	
<u>Acres</u>								
Cropland:								
Owned	1,285	936	593	296	2,026	673	518	
Rented in	1,112	1,791	1,469	742	1,005	819	791	
Rented out	399	187	144	8	288	61	210	
Operated	1,999	2,540	1,919	1,030	2,743	1,431	1,099	
Crops grown:								
Rice	1,061	802	737	337	753	475	318	
Soybeans	2	618	287	426	1,299	765	598	
Cotton	142	0	0	0	196	19	19	
Wheat	194	0	0	0	73	48	0	
Other grains	88	0	26	0	0	0	0	
Other crops	195	12	4	2	22	34	21	

1/ The 1979 rice cost of production survey was designed to obtain data for an average acre of rice by region. Computing averages per farm would be biased toward larger units. The questionnaire requested acreage data only on the four major competing crops in addition to rice. Thus, in some areas the acres reported in crops would not necessarily total to the average acres of cropland.

Source: 1979 Rice Cost of Production Survey.

Table 4--Rice allotment compliance, 1979

Item	California		Texas		Southwest		Mississippi		Arkansas	
	Upper counties	Lower counties	Upper counties	Lower counties	Louisiana	River Delta	Northeast	Grand Prairie		
<u>Percentage of total</u>										
<u>Rice acreage on farms</u>										
Within allotments	22	46	46	73	2	1	7			
Exceeding allotments	65	54	54	22	57	78	86			
No allotment	13	0	0	5	41	21	7			
Allotted acres as a percent of planted acres	74	84	87	96	40	44	65			
<u>1,000 acres</u>										
1979 rice acres harvested	525	330	230	460	618	595	242			

Source: 1979 Rice Cost of Production Survey.

Table 5--Land tenure by areas, 1979

Area	1979 rice acreage on land		
	Owned	Share rented	Cash rented
	Percent		
Northeast, Arkansas	37	54	9
Grand Prairie, Arkansas	35	52	13
Mississippi River Delta	50	30	20
Southwest, Louisiana	14	83	3
Upper Gulf, Texas	13	59	28
Lower Gulf, Texas	24	54	22
California	45	49	6

Source: 1979 Rice Cost of Production Survey.

Table 6--Share and cash rental arrangements by areas, 1979

Area	Type of rental arrangement						
	1/10	1/5	1/4	1/3	2/5	1/2	Cash
	Percent						Dol./Ac.
Northeast, Arkansas	1	3	65	14	5	12	62
Grand Prairie, Arkansas	0	6	13	0	16	65	88
Mississippi River Delta	0	16	25	16	6	37	47
Southwest, Louisiana	0	37	5	15	32	11	31
Upper Gulf, Texas	38	3	8	8	5	39	26
Lower Gulf, Texas	33	4	4	4	0	55	40
California	2	2	27	65	4	0	65

Source: 1979 Rice Cost of Production Survey.

Cost of Production

The costs of production for 1977, 1978, and 1979 are presented in tables 7, 8, and 9. Per acre variable costs of the United States increased 6.3 percent in 1978 and 10.1 percent in 1979. Labor, machinery operation, and drying costs were the major contributors to the sharp rise in 1979. Per acre machinery ownership costs were up even more than variable costs, with a 12 and 21 percent increase in 1978 and 1979, respectively. General farm overhead rose 11 and 13 percent during those two years. Yields, rising moderately in both years, softened the impact on per hundredweight costs.

Returns

Returns to land, management, and risk per acre of rice in the United States decreased 20 percent in 1978, but increased to near the 1977 level by 1979 (tables 7, 8, and 9). The decrease in returns in 1978 was much greater for the production not covered under Government programs. A deficiency payment of 78 cents per hundredweight was paid in 1978 on the allotment acreage, making up some of the decline in returns brought on by lower prices received and rising costs. No deficiency payment was needed in 1977 or 1979.

High California yields in 1979 sharply increased returns in that State over all the other areas. In 1978, California returns were the lowest. Consistently low returns in the Gulf Coast region (Southwest Louisiana, Upper Gulf Texas, and Lower Gulf Texas) point to possible adjustments in rice farm structure and rice production practices in the near future.

Trends in U.S. Acreage, Yield, and Production

Area planted to rice in the United States since 1965 has varied from a low of 1.8 million acres in 1965, 1970, 1971, and 1972 to 3.4 million acres in 1980 (figure 3). ^{3/} Acreage expanded rapidly after World War II until production controls and marketing quotas were imposed for the 1955 crop. Plantings were restrained by Government programs from 1955 through 1973 to prevent large surpluses.

When marketing quotas were suspended, starting in 1974, the result was a sharp rise in national acreage, although not all regions reacted in the same manner. Acreage tripled in Northeast Arkansas from 1973 to 1979, and nearly quadrupled in the Mississippi River Delta (table 1). A moderate decrease occurred in the Grand Prairie of Arkansas, and the Sacramento Valley of California had a 30-percent increase. Southwest Louisiana and the Coast Prairie of Texas had the least change. The 1973-79 expansion was related to profitability of rice compared with alternative enterprises, physical facilities available for producing rice, and the voluntary features of Government programs.

^{3/} See appendix tables 1-7 for 1965 to 1979 area, yield and production by State and United States.

Table 7--Rice: Comparison of costs and returns, 1977

Item	Unit	Arkansas (non-Delta)	Mississippi Delta	Gulf Coast	California	United States
Acreage harvested	1,000 ac.	680.70	336.50	933.80	310.00	2,261.00
Yield	Cwt.	43.32	39.96	41.35	57.78	43.99
Target price	Dol./cwt	8.25	8.25	8.25	8.25	8.25
Market price <u>1/</u>	Do.	9.79	9.80	9.27	9.15	9.49
Value of production	Dol./ac.	424.10	391.61	383.31	528.69	417.47
Deficiency payment <u>2/</u>	Do.	--	--	--	--	--
Total returns	Do.	424.10	391.61	383.31	528.69	417.47
Costs:						
Variable	Dol./ac.	170.73	169.12	190.96	205.94	183.67
Machinery ownership	Do.	38.83	36.59	47.90	40.66	42.49
Farm overhead	Do.	7.79	7.79	7.04	15.28	8.51
Total specified cost	Do.	217.35	213.50	245.90	261.88	234.67
Returns above specified costs:						
With allotments	Do.	206.75	178.11	137.41	266.81	182.80
Without allotments	Do.	206.75	178.11	137.41	266.81	182.80

1/ Season average price.2/ No deficiency payment.

Table 8--Rice: Comparison of costs and returns, 1978

Item	Unit	Arkansas (non-Delta)	Mississippi Delta	Gulf Coast	California	United States
Acres harvested	1,000 ac.	879.60	545.40	1,075.00	493.00	2,993.00
Yield	Cwt.	44.55	42.45	42.09	51.88	44.49
Target price	Dol./cwt	8.53	8.53	8.53	8.53	8.53
Market price 1/	Do.	8.47	8.15	8.42	7.06	8.16
Value of production	Dol./ac.	377.34	345.97	354.40	366.27	363.04
Deficiency payment 2/	Do.	34.75	33.11	32.83	40.47	34.70
Total returns	Do.	412.09	379.08	387.23	406.74	397.74
Costs:						
Variable	Dol./ac.	183.81	184.09	199.57	218.91	195.31
Machinery ownership	Do.	44.12	41.51	54.01	46.61	47.61
Farm overhead	Do.	8.40	8.40	7.62	16.47	9.45
Total specified cost	Do.	236.33	234.00	261.20	281.99	252.37
Returns above specified costs:						
With allotments	Do.	175.76	145.08	126.03	124.75	145.37
Without allotments	Do.	141.01	111.97	93.20	84.28	110.63

1/ Season average price

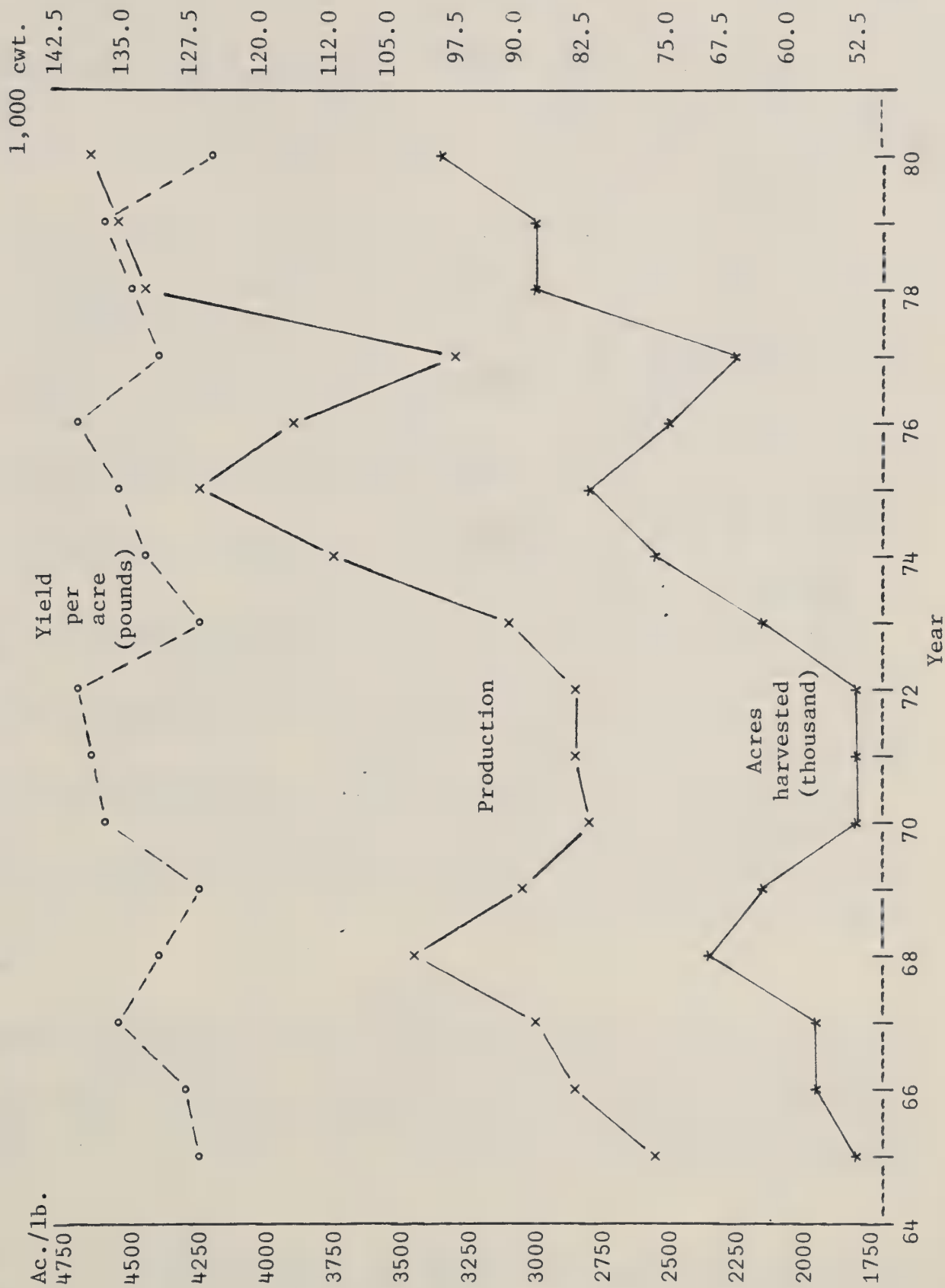
2/ Deficiency rate was \$.78.

Table 9--Rice: Comparison of costs and returns, 1979

Item	Unit	Arkansas (non-Delta)	Mississippi Delta	Gulf Coast	California	United States
Acreage harvested	1,000 ac.	837.00	618.00	1,020.00	525.00	3,000.00
Yield	Cwt.	43.51	41.20	40.30	64.10	45.54
Target price	Dol./cwt	9.05	9.05	9.05	9.05	9.05
Market price <u>1/</u>	Do.	10.32	10.35	10.24	9.64	10.18
Value of production	Dol./ac.	449.02	426.42	412.67	617.92	463.60
Deficiency payment <u>2/</u>	Do.	--	--	--	--	--
Total returns		449.02	426.42	412.67	617.92	463.60
Costs:						
Variable	Do.	197.71	200.23	225.71	239.90	215.13
Machinery ownership	Do.	52.93	50.29	65.59	57.00	57.40
Farm overhead	Do.	9.44	9.44	8.51	18.51	10.71
Total specified costs	Do.	260.08	259.96	299.81	315.41	283.24
Returns above specified costs:						
With allotments	Do.	188.94	166.46	112.86	302.51	180.36
Without allotments	Do.	188.94	166.46	112.86	302.51	180.36

1/ August-December average.2/ No deficiency payment.

Figure 3. Rice: Acreage, Yield, and Production



A market-oriented program passed by Congress in 1975 did not restrict acreage. Declining prices in 1976 was the major reason for reduced U.S. acreage that year. Prices recovered during marketing year 1977/78, and as a result record acreages were planted in 1978, 1979, and 1980.

U.S. rice yields showed an upward trend of 24 pounds per acre per year from 1900-54. The yield in 1900 of 1,221 pounds per acre doubled by 1954. Allotments and marketing quotas were imposed on 1955 and subsequent crops. Marginal land was removed from production, and as a result yields increased rapidly to 3,061 pounds per acre in 1955 and to a high of 4,700 pounds per acre in 1972.

The trend in yields is similar for each State, although levels are different. California has consistently had higher yields than other States, reaching a record 6,450 pounds per acre in 1979. Yields in Louisiana and Mississippi, with few exceptions have been consistently lower than in other States. Several factors contribute to yield variance, but weather is the key factor. California receives very little rainfall and has excellent sunshine during the growing season. Rainfall increases from the Western Gulf Coast to the East, and yields tend to decline due to fewer days of full sunshine and increased disease problems related to moisture. A longer growing season in the Western Gulf Coast area makes it possible to produce a ratoon, or second crop. Therefore, yields west of Houston are consistently higher than those east of Houston. Growers in Arkansas and Mississippi have fewer problems with disease and insects than the Gulf Coast areas of Louisiana and Texas.

U.S. production ranged from 76.3 to 104.1 million hundredweight during the period 1965-73 when acreage controls were in effect. The suspension of marketing quotas in 1974 and subsequent crops resulted in a sharp rise in U.S. production to 140.2 million hundredweight in 1980. This increase was due to increased acreage.

Long grain has accounted for about 50 percent; medium grain, 40 percent; and short grain, 10 percent of U.S. rice production over the past decade. Arkansas, Mississippi, and Texas producers grow mostly long grain. California and Louisiana lead in medium-grain production. Short grain rice is produced in California and to a limited extent in Arkansas.

Elasticities

The elasticity of rice production is defined as the percentage change in the quantity of rice produced in response to a percentage change in rice price. Recent research has provided estimates of the acreage, yield, and production response of rice to a change in farm price. ^{4/} Elasticities were estimated for each major State and the United States using 1975 as a base year (table 10).

^{4/} Grant, Warren R. and Mack N. Leath, Factors Affecting Supply, Demand, and Prices of U.S. Rice, ESCS, USDA, ESCS-47, March 1979.

Table 10--Estimated rice supply elasticities for 1975

State	$E_{A/P}$	$E_{Y/A}$	$E_{Q/P}^{1/}$
Mississippi	0.78	-0.43	0.44
Texas	.19	-.23	.15
Louisiana	.31	..00	.31
Arkansas	.82	-.39	.50
California	.55	-.45	.30
United States <u>2/</u>	.52	-.28	.35

$$1/ \quad E_{Q/P} = E_{A/P} (1 + E_{Y/A})$$

2/ Weighted elasticities based on State acreage.

Area

The elasticity of harvested acreage with respect to lagged farm price ranged from a low of 0.31 in Louisiana to a high of 0.82 in Arkansas. Land and water restrictions are less of a limiting factor in the areas with higher elasticities. Water limitations on the Gulf Coast limit an upward adjustment in acreage. Using each State's share of acreage as weights, the estimated elasticity of U.S. acreage with respect to lagged farm price was 0.52 for 1975. That is, a 0.52-percent change in acreage was associated with a 1-percent change in lagged farm price in the same direction. Estimates based on 1923-40 and 1948-54 data, estimated elasticity of U.S. rice acreage with respect to lagged farm price, deflated by the index of prices paid, at 0.33 for 1954. 5/ This study found that yield was not appreciably affected by lagged, deflated farm price.

Yield

The recent study indicated no direct effect on yield by price changes, although the acreage changes in response to price changes did affect yields. The elasticity of average yield with respect to harvested acreage ranged from 0.00 in Louisiana to -0.45 in Mississippi and California. Again, using State shares of acreage as weights, the estimated elasticity for U.S. average yield with respect to acreage harvested is -0.28.

5/ Kincannon, John, Statistical Analysis of Rice Supply and Demand Before and During Government Programs, Tex. Agr. Exp. Stat., Misc. Pub. 273, Apr. 1958.

Production

The elasticity of production with respect to lagged farm price is a combination of the direct effect of acreage changes in response to price changes and yield changes in response to acreage changes. The estimated production elasticities with respect to lagged farm price for 1975 ranged from 0.15 in Texas to 0.50 in Arkansas. The weighted average elasticity for the United States was 0.35. That is, a 1-percent change in price will result in a 0.35-percent change in production in the same direction.

TRENDS IN WORLD PRODUCTION

Rice, a major world food crop, is primarily consumed within the borders of producing countries. Asia, with nearly 60 percent of the world population, produces and consumes 90 percent of world rice production. The United States produces less than 2 percent of world crop, but accounts for around 30 percent of world rice trade.

Production

World rice production of 168 million metric tons in 1950 has more than doubled to 392 million metric tons in 1980. Growth in production has been relatively steady at about 7 million metric tons per year, with major deviations from the annual trend line due primarily to abnormally favorable weather (table 11).

Improved rice varieties and new technology have contributed heavily to the increase in world production since 1965. Increased production from improved varieties and technology is much greater under ideal weather than the response from traditional rice varieties and inputs. However, the high yielding and traditional varieties react about the same to abnormally severe weather. The world production peaks and troughs have been greater with improved varieties and technology.

China and India together have consistently produced over one-half of the world crop since 1950. Those countries plus Indonesia, Bangladesh, Japan, and Thailand account for three-fourths of world production. The United States usually ranks about 12th.

Area

Land area in world rice production increased from 103 million hectares in 1950 to 145 million hectares in 1980. Very little Asian land not currently growing rice is suitable for rice production unless major investments in irrigation and other improvements are made. China and India dominate planted area statistics, just as they dominate production. The United States, with less than 1 percent of the world's rice area, ranked 16th in harvested area during 1977.

Table 11--World rice supply and distribution, 1966/67-1980/81 1/

Marketing years	Area harvested	Yield 2/	Production		Calendar year exports	Total uti- lization	Ending stocks 4/	Stocks as % of utilization 5/
			Rough	Milled				
	Million hectares	Metric tons	-- Million metric tons --					
								Percent
1966/67	120.6	2.13	256.7	173.9	7.4	174.2	9.6	5.5
1967/68	122.4	2.27	277.9	188.2	6.8	183.8	12.7	6.9
1968/69	123.6	2.27	280.4	189.8	7.1	185.7	16.4	8.8
1969/70	127.0	2.30	292.1	197.5	7.8	193.8	18.8	9.7
1970/71	126.5	2.39	302.5	204.6	8.1	204.5	18.9	9.2
1971/72	127.6	2.42	308.6	208.6	8.1	210.4	16.2	7.7
1972/73	126.6	2.33	294.8	199.5	7.8	203.1	10.8	5.3
1973/74	130.5	2.44	318.9	215.7	7.9	213.5	12.7	5.9
1974/75	132.6	2.45	325.5	220.0	7.3	221.8	11.1	5.0
1975/76	147.8	2.52	372.1	250.6	9.4	242.1	18.6	7.7
1976/77	141.6	2.47	350.0	236.2	10.4	236.4	17.6	7.4
1977/78	143.8	2.58	370.8	250.0	9.7	244.8	22.8	9.3
1978/79	143.4	2.68	384.4	259.5	11.8	254.7	27.4	10.8
1979/80	141.7	2.64	373.8	252.5	12.6	256.0	24.0	9.4
1980/81 6/	145.0	2.70	391.6	264.3	12.3	262.8	25.5	9.7

1/ Production is expressed on both rough and milled basis; stocks, exports and utilization are expressed on milled basis.

2/ Based on rough production.

3/ For countries for which stocks data are not available, utilization estimates represent "apparent" utilization, i.e., they are inclusive of annual stock level adjustments.

4/ Stocks data are based on an aggregate of differing local marketing years and should not be construed as representing world stock levels at a fixed point in time. Comparable data not available for years prior to 1966/67.

5/ Stocks as percentage of utilization is the ratio of marketing year ending stocks and total utilization.

6/ Preliminary.

Source: Foreign Agriculture Circular, For. Agr. Serv., U.S. Dept. Agr., Sept. 1980.

Yield

World yield increased from 1.63 metric tons (rough-rice basis) per hectare in 1950 to 2.65 metric tons per hectare in 1979, a 63-percent increase. Yields improved at an average of 0.031 metric ton per year between 1950-76; they increased in the early part of the period, declined slightly in the middle, and resumed the increase near the end under the influence of favorable weather and new technology. A large portion of the world rice area is solely dependent on rainfall for moisture. Thus, any change in weather patterns in major rice areas affects both the area in rice and the yield.

PROCESSING AND MARKETING

Relative to some segments of the U.S. agricultural industry, the rice sector has a relatively simple structure (figure 4). Rice marketing involves only a few changes of ownership between the farmer and the consumer; processing for major end uses is comparatively simple, and distribution channels are limited. The usual steps from the farm to the grocery shelf include drying and storage, milling and processing, and distribution.

Drying and Storage

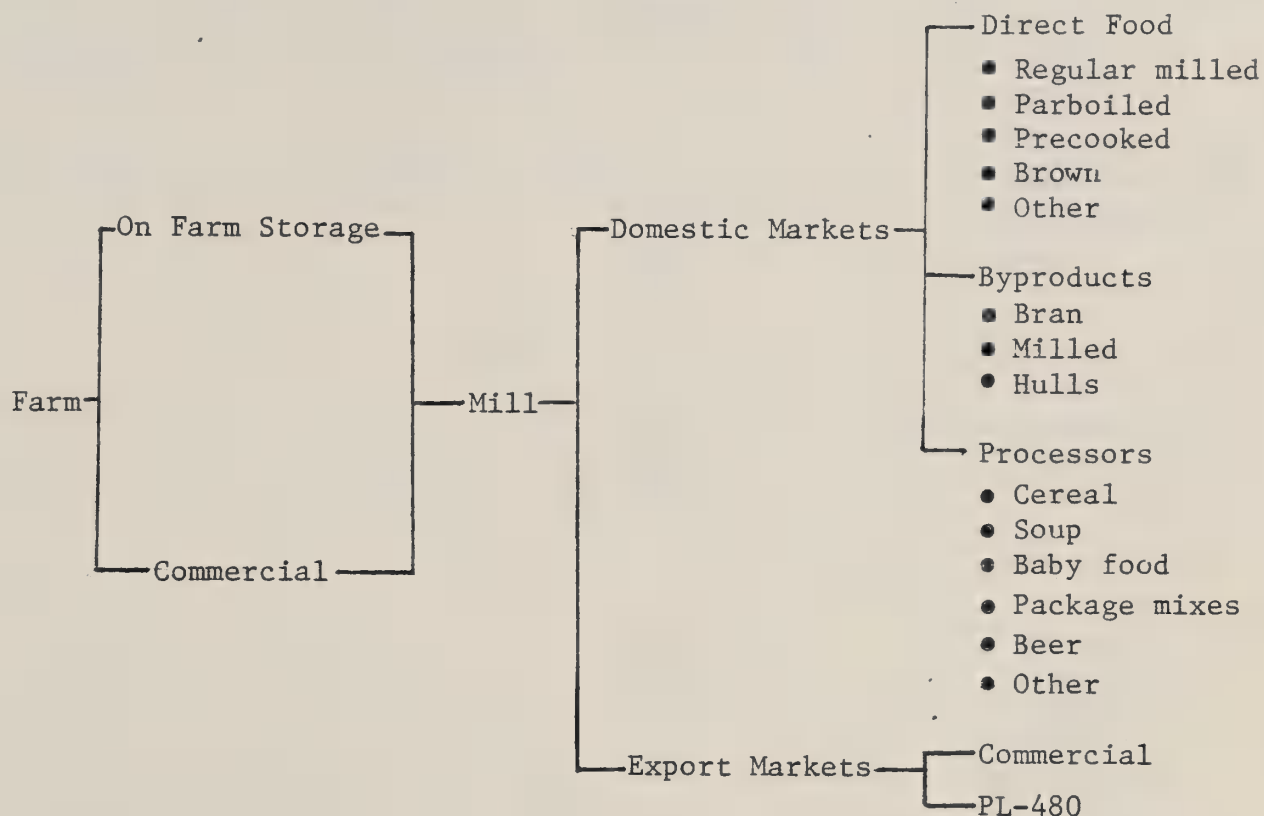
Rice harvesting methods in the United States during the past 30 years have progressed from threshing and field drying to use of self-propelled combines and artificial drying. Rice is normally harvested with moisture levels ranging from 18 to 25 percent. It must be dried to about 13-percent moisture for safe storage. Commercial dryers are public facilities that receive, dry, store, and load out rough rice on a fee basis, and usually service rice producers within a radius of 25 to 30 miles.

Onfarm Drying and Storage

A growing percentage of the U.S. rice crop is being dried and stored on the farm. Factors contributing to this include: (1) a growing interest on the part of farmers for better control over their production, (2) the stronger profit position of rice farmers in 1973 and 1974 that encouraged investment in onfarm storage facilities for tax purposes, (3) the farm facility loan program and favorable depreciation allowances for construction of farm storage facilities, (4) savings on drying and storage costs, and (5) lack of adequate commercial rice drying and storage capacity in some recently expanded rice areas.

Data on the proportion of rice dried and stored on the farm was obtained from the 1979 national cost of production survey for the 1979 crop. According to that survey, onfarm rice drying and storage varied from 15 percent of production in California to 60 percent of production in the Mississippi Delta (table 12).

Figure 4. Market Channels for U.S. Rice



Commercial dryers are expected to continue to dry the majority of rice, but the trend toward more farm storage could have some effects on existing commercial facilities. Although most commercial dryers have multigrain operations, many are heavily dependent on rice receipts for much of their volume. Commercial rice dryers rely on large annual receipts for profitable operation; therefore, a reduction in volume can have a serious financial impact.

Commercial Drying and Storage Facilities

There were 263 commercial rice dryers in the United States in 1979, and about one-half had storage capacities under 400,000 cwt. (appendix table 13). Texas had the largest share of firms with capacities under 200,000 cwt., while Arkansas had the largest concentration of firms over 1,000,000 hundredweight.

U.S. commercial rice dryer/storage capacity was 167 million hundredweight in 1979. Firms with storage capacities of over 1,000,000 hundredweight accounted for 54 percent of total capacity. Less than 4 percent of the total was accounted by firms with capacities under 200,000 hundredweight.

Table 12--Proportion of rice dried onfarm and off-farm,
by state, 1979 crop

Area	Place dried		
	Onfarm	Off-farm	
		Commercial dryer	Other <u>1/</u>
		<u>Percent</u>	
Grand Prairie			
Arkansas	22	69	9
Northeast Arkansas	34	53	13
Mississippi Delta <u>2/</u>	60	31	9
Southwest Louisiana	29	48	23
Upper Coast, Texas	31	60	9
Lower Coast, Texas	23	74	3
Southern States	37	51	12
California	15	85	0
United States	33	57	10

1/ Rice sold green or undried. It is usually dried in facilities owned by the mill making the purchase.

2/ Includes parts of Arkansas, Mississippi, and Northeast Louisiana.

Commercial rice-dryer numbers showed little change from 1965 to 1973, although significant shifts occurred in size of firms (appendix table 14). During that time, commercial rice dryers with capacities under 180,000 hundredweight decreased by 46 percent. Most of this change resulted from existing firms adding capacity. Thus, firms with over 180,000 hundredweight storage capacity increased significantly during 1965-73. The release of rice acreage in 1974 resulted in a quick expansion in planted acres. With this came a need for additional rice storage capacity. By 1979, the number of commercial rice dryers had increased to 263, up 44 from 1973 (appendix table 13). In addition to new plants, many existing plants added storage capacity.

Cooperative facilities accounted for 43 percent of total storage capacity in 1979, although they accounted for only 29 percent of the firms (appendix table 15). Cooperative ownership of rice dryers is especially strong in Arkansas and California.

Milling

Active rice mills in the United States declined from 65 in 1962 to 40 by 1972 (table 13). New construction increased the total to 47 active mills by 1979. The major rice milling centers are Stuttgart, Ark., Sacramento, Calif., Crowley, La., and Houston, Tex. Average annual mill volumes varied from over 9 million hundredweight to less than 100,000 hundredweight. Two-thirds of the U.S. rice crop is milled by less than a dozen firms.

Cooperative rice mills in Arkansas, California, Mississippi, and Texas processed around 50 percent of the U.S. rough rice in 1978/79. About two-thirds of the rough rice in Arkansas and California is milled by farmer cooperatives.

Marketing

U.S. producers sell rice directly to a private mill or consign to a cooperative mill before or after drying. The cooperatives mill and/or market the rice for their members. The private mills buy rice at public sales, by private negotiation, or through contracts.

Methods

Most rice in Texas and Louisiana is marketed privately while rice in other areas of the United States is sold principally through cooperatives. The seasonal pool concept is used by Arkansas cooperatives which handle about two-thirds of the State's production. Cooperatives dry, store, mill and market the members' rice. An initial payment is made to the grower when the rice is delivered to the cooperative. The initial payment amounts to about 75 percent of the support price (loan rate) and may vary depending on variety, type and milling quality. The grain is stored on a commingled basis after sampling and grading. Additional payments are made throughout the year. An equalization payment is made in April to equalize the percentage paid to growers on each lot of rice on the basis of grade and milling quality. The final pool payment is made in September of the year following harvest. Costs of drying, storage, and freight are pooled, with each producer paying an equal amount per unit of rice.

Cooperatives in California market about 80 percent of the crop and pay an advance to growers upon delivery. Each load is sampled, graded, and then commingled. The equalization payment is made by January 1, with monthly advances until final settlement in September.

Rice in Texas, Louisiana, and Mississippi may be sold green, at a public sale, by private negotiation, contract, or consigned to a cooperative. Cooperatives operate on a pool basis similar to Arkansas cooperatives and handle about one-third of the crop. These cooperatives differ from those in Arkansas and California in that they have sold part of their members' rough rice in negotiated sales to private mills. The Arkansas and California cooperatives mill the rough rice and make sales to wholesalers, exporters, and retailers, rather than to private mills.

Table 13--Active rice mills in the United States, selected years

Year	Arkansas	California	Louisiana	Mississippi	Tennessee	Texas	U.S. total
1962	9	9	32	0	1	14	65
1965	9	8	27	0	1	13	58
1966	9	7	22	0	1	11	50
1967	9	6	19	0	1	7	42
1972	8	6	16	2/ 1	1	8	40
1978	10	7	15	3	1	10	44
1979	16	6	10	3	1	11	47

1/ 1962 through 1967 data based on Marshall R. Godwin and Lonnie L. Jones, The Southern Rice Industry, Texas A & M Univ. Press, College Station, Tex., 1970. Later years based on rice distribution surveys.

2/ Construction was started on this mill in 1972; it did not become operational until 1973.

Quality Determination

Quality determination is generally based on a mixture of subjective and objective factors. U.S. standards provide a base or starting point for quality evaluations of rough rice, brown rice for processing, and milled rice, including second heads, brewers, and screenings (appendix fig. 1). How the quality factors are ranked in making quality evaluation depends largely upon end use. A housewife shopping for table rice might prefer a long-grain rice that cooks dry and fluffy, and would rank these factors of foremost importance. A cereal manufacturer, wishing to make a puffed rice, might rank a short, plump grain of primary importance and be unconcerned if it was sticky if cooked as table rice.

Whether a rice is suited for an intended end use is primarily determined by quality testing. Quality is evaluated in the United States according to color and general appearance, cooking and processing characteristics, milling yield, and cleanliness.

Futures Exchange

Historically, there has been little forward contracting by the U.S. rice industry, primarily because for nearly 25 years rice supplies were controlled through allotments and prices stabilized by price supports. Acreage restrictions were eliminated for 1974 and subsequent crops, and support prices were adjusted in relation to world levels. Consequently, U.S. rice prices moved in relation to world markets. In an effort to lock in a price, both farmers and mills became interested in forward contracts on at least a part of the crop. Volume marketed by this method has been relatively small, but it has provided a means of price stability in the absence of a rice futures market.

An effort is currently underway to establish a rice futures market at New Orleans, La. The first known futures exchange for trading contracts for forward delivery was established in Tokyo in 1650 and dealt only in rice. 6/ That was some 150 years prior to the establishment of any organized futures trading in the United States. Trading in milled rice was established briefly by the New York Mercantile Exchange in the early 1960's and for rough rice in 1969; however, both attempts failed.

There was relatively little price variability prior to 1972, and no incentive for a rice futures market. The price fluctuations of the past 4 years have rekindled support for a futures market. A successful futures market depends upon more than price variability. Traders must feel that the market offers a reasonable opportunity for fair gain. Hedgers or speculators are reluctant to trade if they believe that supplies may be controlled. Rice markets possess this potential, since much of the volume is controlled by vertically integrated cooperatives. The bulk of the crop can be held by only a few firms, especially near the end of

6/ The discussion on futures trading is based on Harlon D. Traylor, "Futures Trading Rules for Rice Reexamined," Proceedings ...Fifteenth Rice Technical Working Group, Fayetteville, Ark., Mar. 12-14, 1974.

the crop year. There would be a potential for market squeeze, even if such actions were unintentional. Additionally, the importance of P.L. 480 and other Government programs could raise fears among speculators that actions adverse to their interests might occur.

Trading volume also is an important consideration in assessing the potential for a rice futures market. Low-volume trading may not provide the basic protection hedgers seek. Trading volume depends, to some extent, upon how many times the commodity changes ownership between producer and final processor and on the total quantity produced. Rice dryers normally do not merchandise rice; initial transfer of ownership is often direct from producer to miller. This is in contrast to other grains; ownership often changes two or more times prior to acquisition by final processor. Several potential hedgers, thus, do not exist in the rice marketing system.

A futures market for rice would be successful only if there were sufficient price action, the market constituted a reasonably fair chance for speculative profit, and volume of trading were adequate to protect basic positions.

Prices

U.S. rice prices since 1950 have been heavily influenced by Government programs. Support prices were above world price levels between 1955 and 1972, which isolated domestic prices from factors affecting world rice prices. A worldwide drop in production of rice and other grains in 1971 and 1972 brought a rapid rise in prices in the fall of 1972. U.S. prices nearly tripled by the middle of crop year 1973. This, plus a change in the 1976 U.S. rice program, made domestic price levels more market oriented. Three successive years of record world rice production (1973-75) lowered U.S. and world prices to slightly above the pre-1972 level.

Domestic

U.S. rice prices are measured and reported at two points in the domestic market: (1) ESS-Statistics collects and reports average rough-rice prices received by producers by State monthly and mid-month. (2) AMS Market News reports f.o.b. mill price for milled rice by grade and type, and for byproducts. AMS Market News also reports some farmer sales of rough rice on a weekly basis. The point of sale is at the elevator. A third point, average retail price in 38 U.S. cities by type of rice, was discontinued in July 1978.

Rough rice--The seasonal average rough-rice price received by farmers in the United States since 1950 has varied from a low of \$4.55 per hundredweight in 1960 to a high of \$13.80 per hundredweight in 1973 (appendix table 16). Rough-rice prices, however, were heavily influenced by domestic support prices for over 20 years (August 1950 to August 1972), varying by less than \$3 between the low and high.

U.S. seasonal average price received by farmers between 1950 and 1979 ranged from 35 cents per hundredweight below to \$7.73 per hundredweight above the average support prices (appendix table 16). Both the seasonal average price and the support price were above the general world price level from 1955-71. World prices have been above the U.S. support level since 1972, increasing the gap between the average price received by producers and the support price (fig. 5). About 60 percent of U.S. production is exported, so prices are particularly responsive to world prices when the support price is below the world level.

With the enactment of the target price concept in 1976, allotment producers became eligible for deficiency payments when the August-December U.S. average rough rice price fell below the target level. Deficiency payments of \$1.70 and 78 cents per hundredweight were paid to allotment producers in 1976 and 1978, respectively (appendix table 16).

Milled rice--Since 1960, monthly U.S. No. 2 long-grain milled-rice prices have varied from a low of \$9.30 per hundredweight in Arkansas in 1960 to a high of \$31.75 in Texas in 1973 (appendix table 17). Mill prices were relatively stable from 1960 through 1971, when U.S. support prices were above the world level. The sharp rise in mill prices in 1972 and 1973, in response to shortages in world grain production, portrayed similar reactions in U.S. rice prices at all locations. Record world rice crops in 1973, 1974, and 1975 resulted in large carryovers and falling prices.

Monthly medium-grain mill prices usually are slightly below long-grain prices, and short grain below medium; however, they follow each other very closely. The degree of association between Southern and California seasonal average mill prices is not as great as between long and medium in the South, or medium and short in California. This difference is partly due to lag reaction of California prices to Southern prices and to differences in marketing structure.

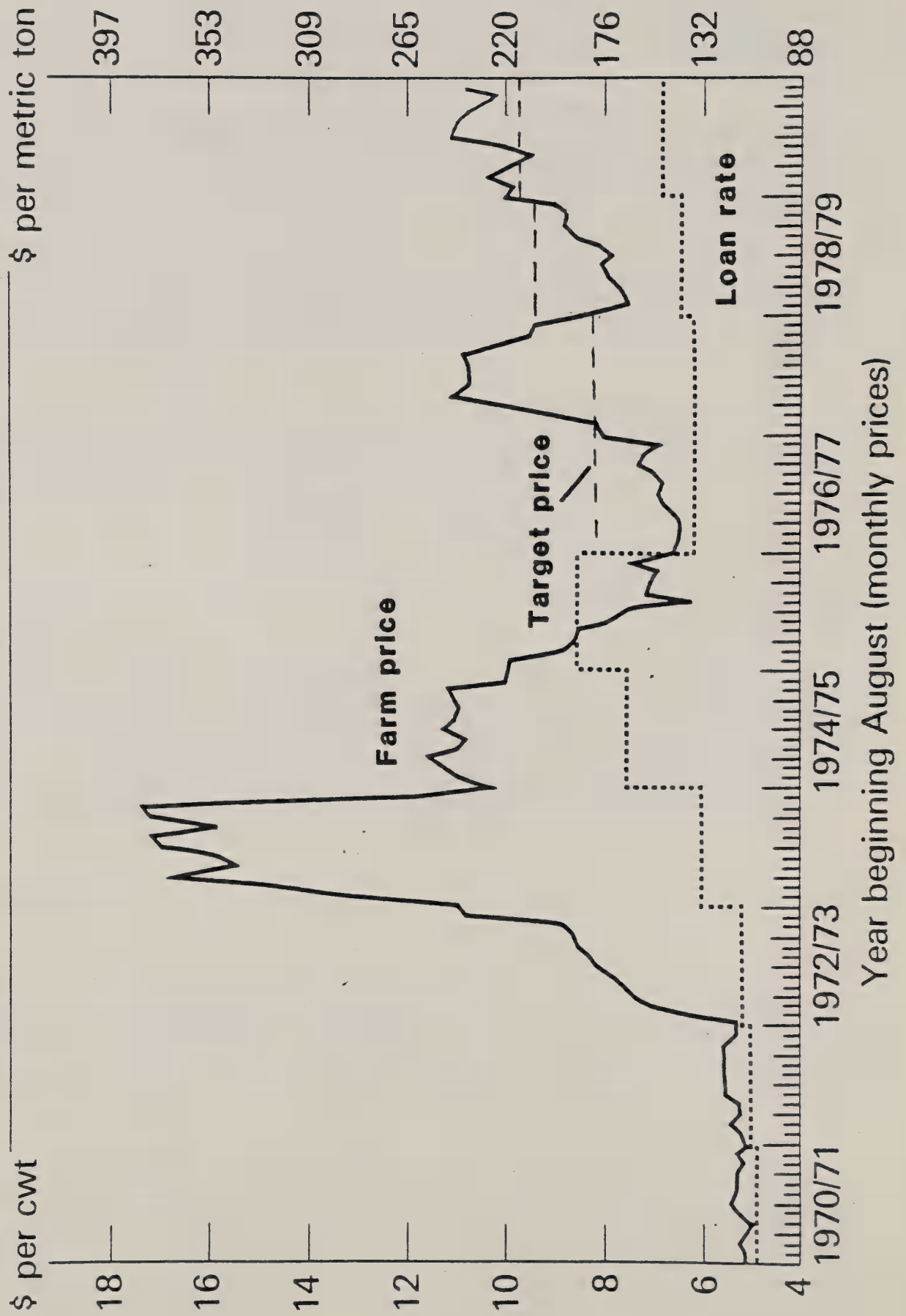
Retail--Retail prices for rice tend to be about double that of milled rice. Monthly long-grain retail prices since 1960 ranged from 20 to 54 cents per pound (appendix table 18).

Price relationships--Price changes at various locations and stages in the market system do not necessarily occur simultaneously. Generally, there is a time lag before price changes work their way through the market. An analysis of monthly price data from August 1959 to August 1975 was used to determine relationships between price changes at different points in the marketing system.

Monthly U.S. rice prices, at farm, wholesale, and retail levels, are highly correlated. California mill prices and U.S. retail prices are slight exceptions, with correlation coefficients in the upper 80's or low 90's when compared with each of the other prices. Some of this unexplained variation is caused by a lag effect of prices. Changes in Southern mill prices influence long-grain retail prices up to about 3 months after the change occurs. This lag effect is only 2 months for California mill prices and retail prices. Changes in Southern farm prices influence mill prices about 2 months after the change. This gives a net

Figure 5.

Rough Rice Farm Prices, Loan Rates, and Target Prices



of about 5 months for farm price changes to work through the market system to the retail level.

Export

U.S. domestic rough-rice prices have been supported since August 1950. This support was through a guaranteed loan during most of the fifties, with the Government accumulating large stocks when the support was above the world price. The U.S. Department of Agriculture began an export payment plan in December 1958 in an effort to help move U.S. rice in world markets at a competitive price. This payment ranged from zero to \$3.97 per hundredweight for long grain, zero to \$3.53 for medium grain, and zero to \$3.53 for short grain. This payment represented the difference between the U.S. support price (milled basis) and the world price level. Export payments were suspended when world prices approached the U.S. support level in 1966. They were reinstated in March 1969 and continued until December 1972. No payment has been made since then.

An official U.S. export price series is not reported on a continuing basis, but those prices may be expressed as the f.o.b. mill price less the export payments.

Export prices for Thailand (f.o.b. Bangkok) are generally considered indicative of the world level. The seasonal average Bangkok f.o.b. mill price, 100 percent white rice, 5 percent broken, ranged from \$5.98 to \$26.46 per hundredweight of milled rice from 1960 to 1979 (appendix table 17).

The Foreign Agricultural Organization (FAO) index of rice export prices is another indicator of the general movement of international prices. This index is based on 21 international prices of various qualities and varieties, each weighted according to its importance in the world rice trade in the base period 1957-59. The long/medium-grain index is heavily weighted by Thai export prices, while the short- or round-grain index is composed primarily of Australian and Italian export prices. The Thai export price and FAO indexes are closely correlated with U.S. monthly export prices.

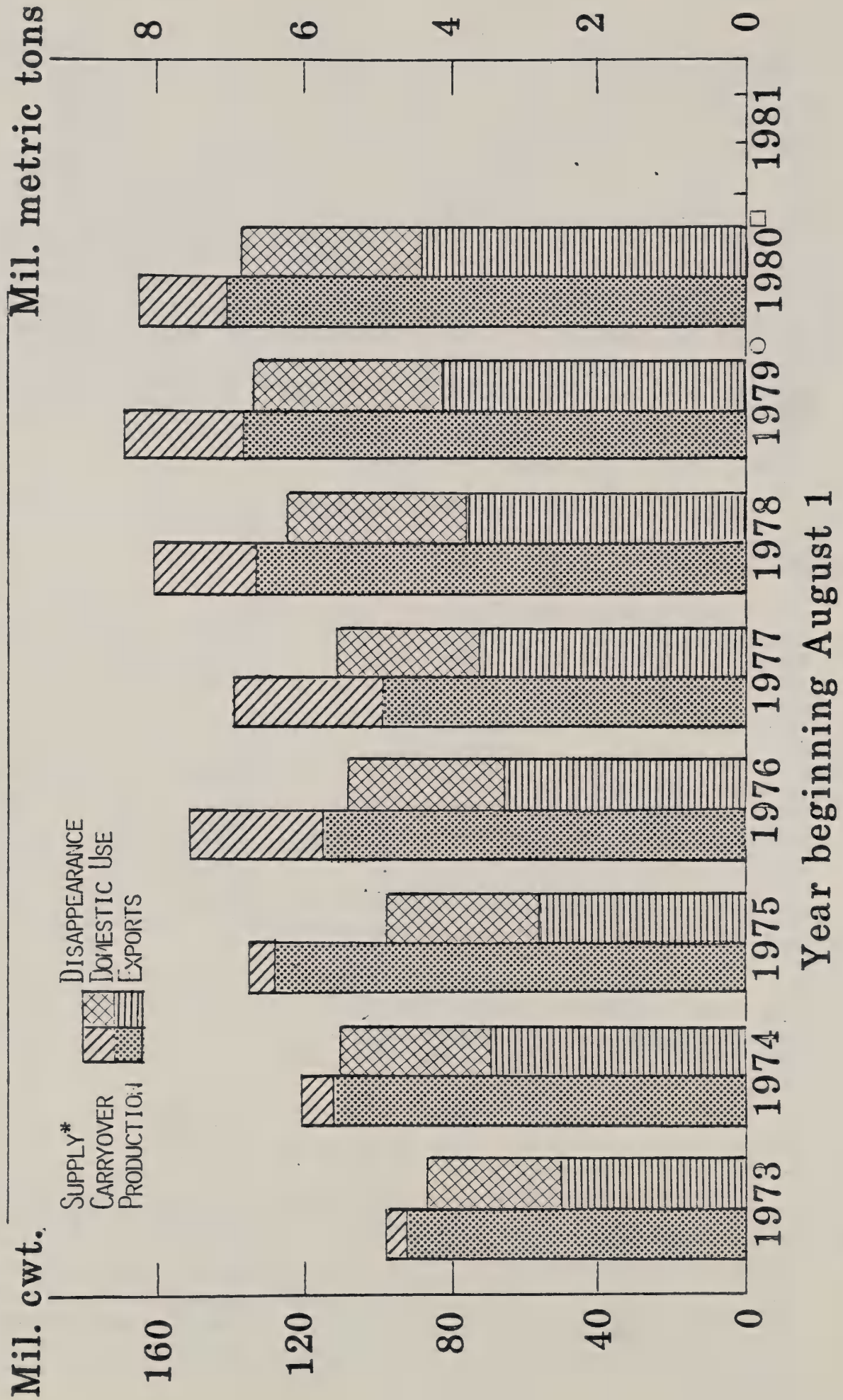
An analysis was made of lag effects between the U.S. export price and three world price indicators. U.S. export prices lead the Thai export prices and the FAO long/medium-grain index 2 to 3 months. This lead is only 1 month for California export prices and the FAO short- or long-grain index.

U.S. RICE DISTRIBUTION

The national and international importance of U.S. rice cannot be fully understood or appreciated without a knowledge of its marketing channels. U.S. rice is distributed to all 50 States, to territories and to over 100 countries of the world. About 40 percent is consumed domestically and the balance is exported. Annual domestic and export disappearance since 1974 have averaged 42 and 64 million hundredweight, respectively (fig. 6). The supply of rice available for milling and processing includes beginning stocks, production, and imports. The supply over the past

Figure 6.

Rough Rice Supply and Disappearance



*INCLUDES IMPORTS. ○PRELIMINARY. □PROJECTED.

20 years ranged from 64.7 million hundredweight (rough basis) in marketing year 1961/62 to 168.4 million hundredweight in 1979/80 (Appendix table 19). Imports seldom account for more than 0.1 percent of total supply, and generally are much less.

Domestic

Direct food use, processed food use, and beer are the three main channels for domestic distribution. Based on 12 rice distribution surveys between marketing years 1955/56 and 1978/79, direct food use is the largest outlet, averaging 63 percent of total domestic use. Beer and processed food accounted for the balance of domestic consumption, with 23 and 14 percent, respectively.

Average annual per capita rice consumption for direct food use in the United States ranged from 5.3 to 6.9 pounds during 1955-78 (table 14). When rice used in processed food and brewing are added to direct food use the U.S. per capita total has been between 10 to 12 pounds since 1969.

Per capita direct food consumption of rice by geographical regions ranges from about 10 to 12 pounds in the Pacific region to 2 to 4 pounds in the Mountain region. Regional growth patterns have not been consistent, although the Middle Atlantic and New England regions have shown a definite long-term trend toward increased per capita consumption. Most of the growth in New England has occurred since 1969/70.

Direct Food Use

Rice for direct food use includes regular milled, parboiled, precooked, brown rice, and specialty products, such as flour and flavored rice. Regular milled rice has accounted for 81 percent of the total consumed for direct food use in the United States since 1969/70. Parboiled and precooked account for about 18 percent of total direct food use, with shares being 12 and 6 percent, respectively.

Total direct food use increased from 8.1 million hundredweight (milled basis) in marketing year 1955/56 to 15.2 million hundredweight by 1978. No data are available for 1955/56 on consumption among various categories (such as regular milled, parboiled, and precooked, so it cannot be determined which contributed most to the increase in direct food use since 1955/56. Parboiled rice shows the most consistent growth since 1969/70. The increase in total consumption for direct food use since 1955/56 is about equally attributable to population growth and increased per capita consumption.

Processed Food Use

Rice used in processed foods includes cereal, soup, baby food, package mixes, and minor unclassified uses. Processed foods accounted for 14 percent of total domestic disappearance in 1978/79 with total use more than doubling since 1955/56.

Table 14--U.S. per capita consumption of rice, by region
and major use, selected years 1/

Region	1955	1956	1960	1961	1966	1969	1971	1972	1973	1974	1975	1978
<u>Pounds</u>												
Direct-food:												
New England	2.1	2.0	2.1	2.0	2.6	2.9	3.2	4.0	3.6	3.5	3.9	3.5
Middle Atlantic	5.2	5.7	5.5	6.3	6.8	8.0	8.3	8.3	9.2	8.7	8.0	9.8
East North Central	2.4	2.3	2.5	2.6	2.4	2.6	3.1	2.8	2.9	2.7	2.7	3.4
West North Central	1.6	1.5	1.6	1.7	2.3	3.6	2.5	4.6	3.5	2.7	2.3	3.9
South Atlantic	7.3	7.2	7.4	7.6	6.9	6.9	7.4	6.8	7.0	6.2	6.5	6.5
East South Central	3.8	3.8	4.8	5.4	3.8	3.9	4.9	3.4	3.0	2.2	2.3	2.3
West South Central	11.2	11.0	11.2	11.9	10.7	10.1	9.3	10.9	8.7	7.8	11.7	10.8
Mountain	1.8	2.0	2.0	2.3	4.4	2.5	2.5	2.7	2.6	2.8	2.8	4.1
Pacific	6.5	5.3	11.3	11.9	8.8	12.5	10.3	10.6	11.1	10.2	11.2	11.9
Total direct-food:	5.3	5.6	5.7	6.1	5.6	6.4	6.2	6.4	6.3	6.3	6.2	6.9
Processed food	1.0	1.0	1.2	1.2	1.5	1.5	1.7	1.5	1.6	1.2	1.3	1.7
Beer	2.1	1.8	1.5	1.6	1.5	2.3	2.0	2.2	2.5	2.9	2.2	3.7
U.S. total	8.4	8.4	8.4	8.9	8.6	10.2	9.9	10.1	10.4	10.4	9.7	12.3

1/ Crop year August 1 to July 31.

Source: Shelby H. Holder, Jr. and Alberta Smith, An Analysis of U.S. Rice Distribution Patterns, AER-413, Econ., Stat. and Coop. Serv., U.S. Dept. Agr., Nov. 1978.

A sharp decline in rice shipments to cereal processors dropped the total processed food use in 1974/75 to 2.5 million hundredweight. Despite that loss, cereals remain the most important processed food use in the domestic market, accounting for 80 percent of all rice distributed to processors. Cereals and package mixes should offer the best possibilities for increased consumption in processed foods. Use of rice as a combination in other processed foods has shown significant but erratic growth since the midfifties.

Beer

Thirty percent (8.2 million hundredweight) of the rice consumed domestically in 1978/79 was used to brew beer. Use by brewers has increased by about 5 million hundredweight since the midfifties, nearly three-fourths occurring since 1969/70. About one-half the domestic growth in rice consumption since 1969/70 is attributable to use by the beer industry. Beer processors are expected to continue to be one of the important domestic market outlets for rice in the future.

Consumption by Type

Long-grain rice is the most popular type for direct food use and accounted for an average of 61 percent of domestic consumption for the 12-year period 1955/78 (table 15). Medium-grain rice accounted for 34 percent of all rice consumed directly. Short-grain rice accounted for 5 percent of the total.

Rice for direct food use also includes parboiled, precooked, and brown rice. Long-grain dominates the specialty market, averaging 96 percent of the total distributed to this outlet from 1969/70 to 1978/79.

Medium- and short-grain rice are demanded by cereal processors, with medium-grain use usually exceeding short-grain use. Beer processors use mostly brokens, which are not classified by type. When brokens are in short supply, they also purchase whole-grain rice, which is granulated prior to use. Large quantities of long-grain were used by beer processors in the midfifties and early sixties. Whole-grain purchases by beer processors shifted in 1973/74 almost solely to medium-grain rice when its price fell significantly lower than long-grain. The availability of poor milling long-grain at favorable prices made it the number one whole-grain rice purchased by beer processors in 1974/75. Nearly 5 million hundredweight of brokens also were used. Use of rice by beer processors reached a new high in 1978/79 when it exceeded 8 million hundredweight, all of which was brokens.

Domestic Elasticities

The response of domestic demand outlets to a change in price has also been estimated. ^{7/} Elasticities were computed for 1975.

^{7/} Grant, Warren R. and Mack N. Leath, Factors Affecting Supply, Demand, and Prices of U.S. Rice, ESCS, USDA, ESCS-47, Mar. 1979.

Table 15--Proportional distribution of U.S. rice for direct-food use,
by type, selected years

Crop year <u>1/</u>	Quantity			
	Long grain	Medium grain	Short grain	Total
	<u>Percent</u>			
1955	53.5	38.2	8.3	100.0
1956	51.7	37.7	10.6	100.0
1960	53.8	32.9	13.3	100.0
1961	52.9	34.1	13.0	100.0
1966	58.5	37.0	4.5	100.0
1969	61.3	33.7	5.0	100.0
1971	67.3	30.3	2.4	100.0
1972	67.0	31.2	1.8	100.0
1973	59.6	37.1	3.3	100.0
1974	67.4	31.2	1.4	100.0
1975	67.3	31.7	1.0	100.0
1978	68.4	29.8	1.8	100.0

1/ Crop year August 1 to July 31.

Source: Shelby H. Holder, Jr., and Alberta Smith, An Analysis of U.S. Rice Distribution Patterns, AER-413, Econ. Stat. and Coop. Serv., U.S. Dept. Agr., Nov. 1978.

The elasticity of per capita domestic food demand with respect to retail price was -0.07 in 1975. That is, a 0.07 percent change in per capita food demand of rice was associated with a 1-percent change, but in the opposite direction in the retail price. Changes in the retail rice price have little effect on direct food use of rice.

The elasticity of per capita domestic food demand with respect to income was estimated at 0.23 in 1975. That is, a 0.23-percent change in per capita food demand for rice was associated with a 1-percent change in the same direction in the index of per capita income.

Attempts were made to determine the importance of potatoes and corn production as a substitute for rice. The research indicated that the substitutability of potatoes and corn for rice was not statistically significant. This does not rule out substitution but suggests that it has not been important in recent years.

The elasticity of demand for rice by brewers with respect to price was estimated at -0.14 for 1975. The income elasticity at 0.12 is slightly less than that for direct food demand.

Export

Exports are the most important use for U.S. rice, averaging 60 percent of total production over the last 10 years. Future growth of the U.S. rice industry is highly dependent upon the viability of this outlet. Commercial export sales provide a more stable source of growth than P.L. 480.

Shipments Under Government Programs

Shipments under Government programs account for a significant share of U.S. rice exports. These shipments have fluctuated from almost 79 percent of the total exports in fiscal year (FY) 1957 to 21 percent in FY 1979 (table 16). With the exception of 1976, the proportion has been declining steadily since FY 1972.

Projections of cereal grain needs worldwide indicate future deficits, especially in the less developed countries. Increases in production in those countries probably will not be sufficient to meet needs of expanding population. Some will have trouble generating enough foreign exchange to pay for their rice import needs. Shipments under Government programs can be expected to continue, but they will account for a smaller share of total U.S. rice exports.

Number of countries receiving rice under the P.L. 480 program has varied over the years, but in any 1 year three or fewer countries account for half or more of the total (table 17). Vietnam, Cambodia, Bangladesh, and Indonesia have been the principal recipients since FY 1974. Indonesia has accounted for the bulk of U.S. rice shipments under P.L. 480 since FY 1977, varying from 72 percent in 1978 to 50 percent in 1979.

Table 16--U.S. exoprts of milled rice, by type of sale, 1956-78

Fiscal year	Commercial	Government programs 1/				Total ex!prts	Proportion Government
		Title I	Title II	AID	Total		
		<u>Millions cwt.</u>					<u>Percent</u>
1956	6.1	2.5	0.2	3.6	6.3	12.4	50.8
1957	5.8	18.0	0.7	2.8	21.5	27.3	78.8
1958	5.9	5.0	2/	1.1	6.1	12.0	50.8
1959	7.8	3.8	2.0	.6	6.4	14.2	45.1
1960	7.6	9.9	.8	2.2	12.9	20.5	62.9
1961	7.1	11.9	.3	2.2	14.4	21.5	67.0
1962	11.2	8.2	--	1.0	9.2	20.4	45.1
1963	10.4	13.5	--	.3	13.8	24.2	57.0
1964	15.6	14.9	--	.7	15.6	31.2	50.0
1965	16.0	12.5	--	--	12.5	28.5	43.8
1966	20.4	7.9	--	2.0	9.9	30.3	32.7
1967	21.0	18.3	--	--	18.3	39.3	46.6
1968	24.4	16.2	--	.5	16.7	41.1	40.6
1969	16.5	21.7	.2	.1	22.0	38.5	57.1
1970	18.7	20.7	.1	.1	20.9	39.6	52.8
1971	13.3	20.3	--	3.4	23.7	37.0	64.0
1972	11.0	17.9	5.5	3.1	26.5	37.5	70.7
1973	18.1	21.3	.7	2.7	24.7	42.8	57.7
1974	21.4	13.4	--	.1	13.5	34.9	38.7
1975	34.1	16.3	.1	2/	16.5	50.6	32.6
1976 3/	27.2	21.5	--	.1	21.6	48.8	44.3
1977 4/	34.8	14.6	.6	2/	15.1	49.9	30.3
1978 5/	36.7	10.2	1.4	--	11.6	48.3	24.0
1979 5/	40.6	9.2	1.5	--	10.7	51.3	20.9

-- = Not applicable.

1/ Title I includes concessional sales for long-term credit repayable in dollars, or in currencies convertible to dollars. Title II donations by U.S. Government and voluntary relief agencies. 2/ Less than \$50,000 cwt. 3/ Includes Transitional Quarter, July-September 1976. 4/ Fiscal year changed from July-June to October-September. 5/ Preliminary.

Source: Rice Situation, Econ., Stat., and Coop. Serv., U.S. Dept. Agr.

Table 17--U.S. milled rice exports under Government programs by country of destination, 1974-79

Country of destination	:	:	:	:	:	:
	:FY 1974:	FY 1975:	FY 1976	<u>1/</u> :FY 1977	<u>2/</u> :FY 1978:	FY 1979 <u>3/</u>
	:	:	:	:	:	:
	:		<u>1,000 metric tons</u>			
Ghana	:	--	--	--	--	10
Guinea	:	--	13	12	13	23
Haiti	:	--	--	--	--	10
Honduras	:	--	11	--	<u>4/</u>	--
India	:	--	--	94	<u>3</u>	4
Indonesia	:	--	--	178	374	383
Israel	:	--	--	3	<u>4/</u>	--
Ivory Coast	:	--	--	--	--	<u>4/</u>
Kanpuchea	:					
(Cambodia)	:	285	217	<u>4/</u>	--	--
Korea, Republic	:					
of	:	7	208	228	61	--
Liberia	:	--	--	--	<u>4/</u>	--
Maritius	:	--	--	--	--	10
Mozambique	:	--	--	--	--	10
Peru	:	--	--	--	--	73
Portugal	:	--	--	77	64	--
Somalia	:	--	--	--	--	10
Syria	:	--	14	42	35	21
Tanzania	:	--	15	6	18	20
Relief of Dacca	:					
(Bangladesh)	:	--	269	311	64	20
Vietnam, South	:	320	--	--	--	--
Western Africa,	:					
N.E.C.	:	--	--	2	--	--
Zaire	:	--	--	28	3	12
Zambia	:	--	--	--	--	4
Other	:	--	--	--	51	47
Total	:	612	747	981	686	530
	:					486

1/ Includes transitional quarter, July-September 1976.

2/ Fiscal year has been changed from July-June to October-September.

3/ Preliminary.

4/ Less than 500 metric tons.

Source: Office of the General Sales Manager, USDA.

Destination of U.S. Rice Exports

Although shipments to Europe and Africa fluctuate, these continents have shown a sharp increase in imports of U.S. rice since 1975 (fig. 7). Exports to Europe totaled almost 9 million hundredweight in 1978/79 (table 18). Shipments to Europe have averaged about 13 percent of total U.S. rice exports since 1969. Exports to Africa were less than 4 million hundredweight in the early seventies, but since 1975 have trended sharply upward, reaching a record 12.1 million in 1977.

Asia historically has been the biggest market for U.S. exports, ranging from 48 percent of the total in marketing year 1978/79 to 81 percent in 1974/75 (table 18). U.S. rice shipments to Asia have varied significantly over the past 10 years, depending mainly on the impact of weather on the Asian rice crop.

Classes of U.S. Rice Exported

Regular milled white rice dominates the U.S. rice export trade, averaging 57 percent of the total from 1966/67 to 1978/79 (appendix table 21). Brown rice accounted for 25 percent, and parboiled 17 percent. Parboiled rice began taking a larger proportional share of the export market in the late 1960's, increasing from 8 percent in 1967/68 to 23 percent in 1977/78 after hitting a record 11.1 million hundredweight.

U.S. Export Elasticities

The estimated U.S. milled rice commercial export elasticity with respect to the U.S. export price at -0.46 for 1975 is considerably smaller than the U.S. milled rice Government export elasticity with respect to the same price (-2.11). A priori expectations point to Government exports being more responsive to price changes than commercial exports. The cross-elasticity of U.S. commercial milled exports to U.S. Government milled exports was -0.17 in 1975. The degree of substitution of P.L. 480 rice for commercial export sales is relatively low. Differentiated markets, quality of product demanded, and credit terms limit substitution between these markets.

WORLD RICE TRADE AND CONSUMPTION

World rice trade which was severely reduced during World War II, nearly doubled between 1950 and 1963. Trade fluctuated between 6.8 million metric tons per year in 1968 to 11.7 million in 1978 (table 11). Total quantity involved in world trade depends primarily on relative supplies in exporting and importing countries. Government policy in both exporting and importing countries has tended to overshadow economic forces in world rice trade.

Figure 7. Where U.S. Rice Exports Go

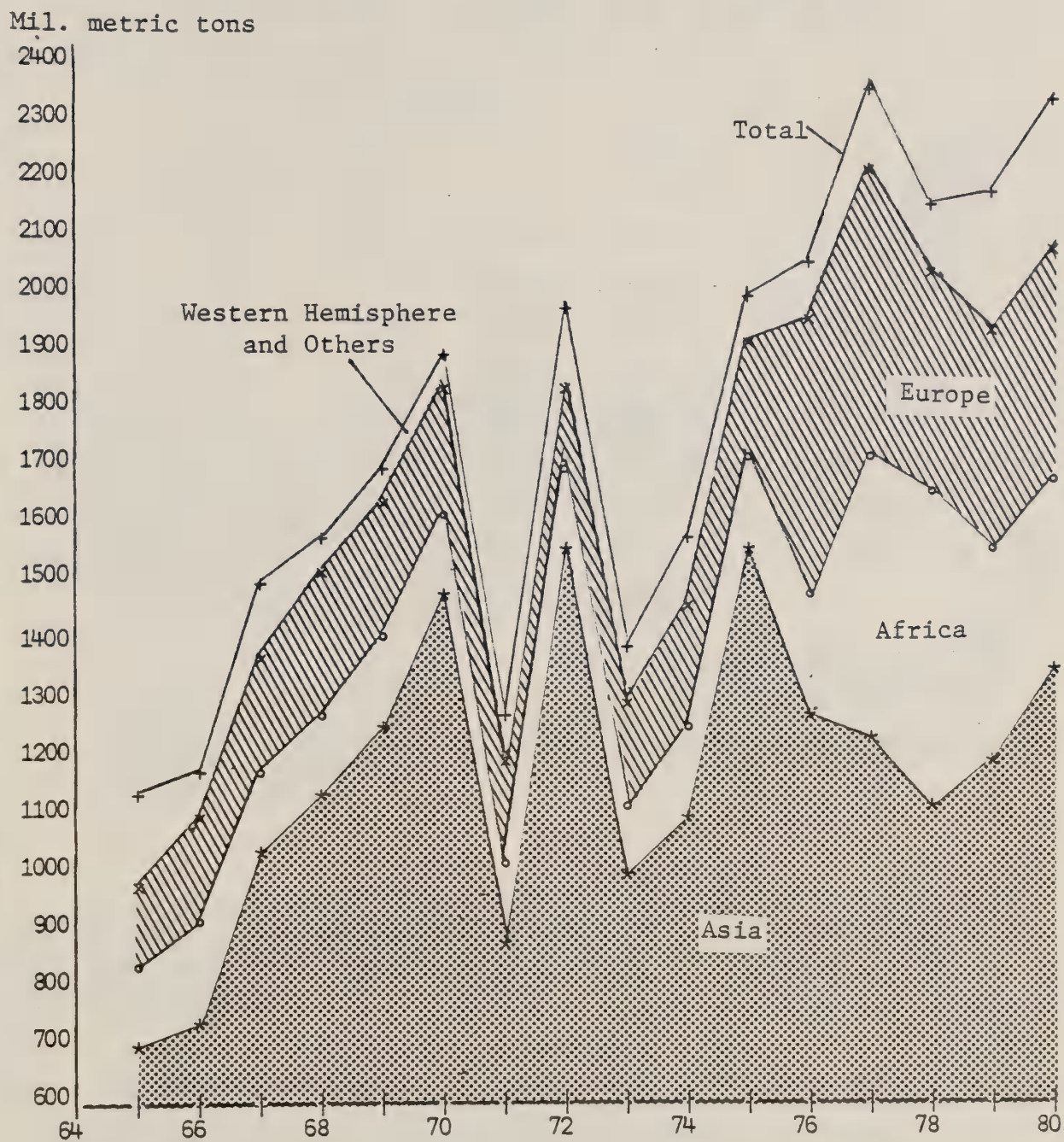


Table 18--U.S. rice exports to major geographical regions, 1969-78

Crop year <u>1/</u>	Western Hemisphere	Europe	Asia	Africa	Oceania	World
			1,000 cwt.			
1969	2,359	4,919	28,107	3,766	346	39,497
1970	2,582	4,307	22,956	3,524	311	33,680
1971	2,423	2,830	32,123	3,490	250	41,116
1972	2,788	3,998	28,312	3,317	337	38,751
1973	4,473	5,044	21,632	3,983	451	35,583
1974	2,144	3,907	40,142	3,414	79	49,686
1975	2,750	8,800	21,998	4,797	104	38,449
1976	3,378	8,615	25,447	8,374	742	46,557
1977	2,712	5,622	26,720	12,125	198	47,377
1978 <u>2/</u>	5,251	8,991	26,373	11,570	250	54,435

1/ Crop year August 1 to July 31.

2/ Preliminary.

Source: Bureau of the Census.

Trade

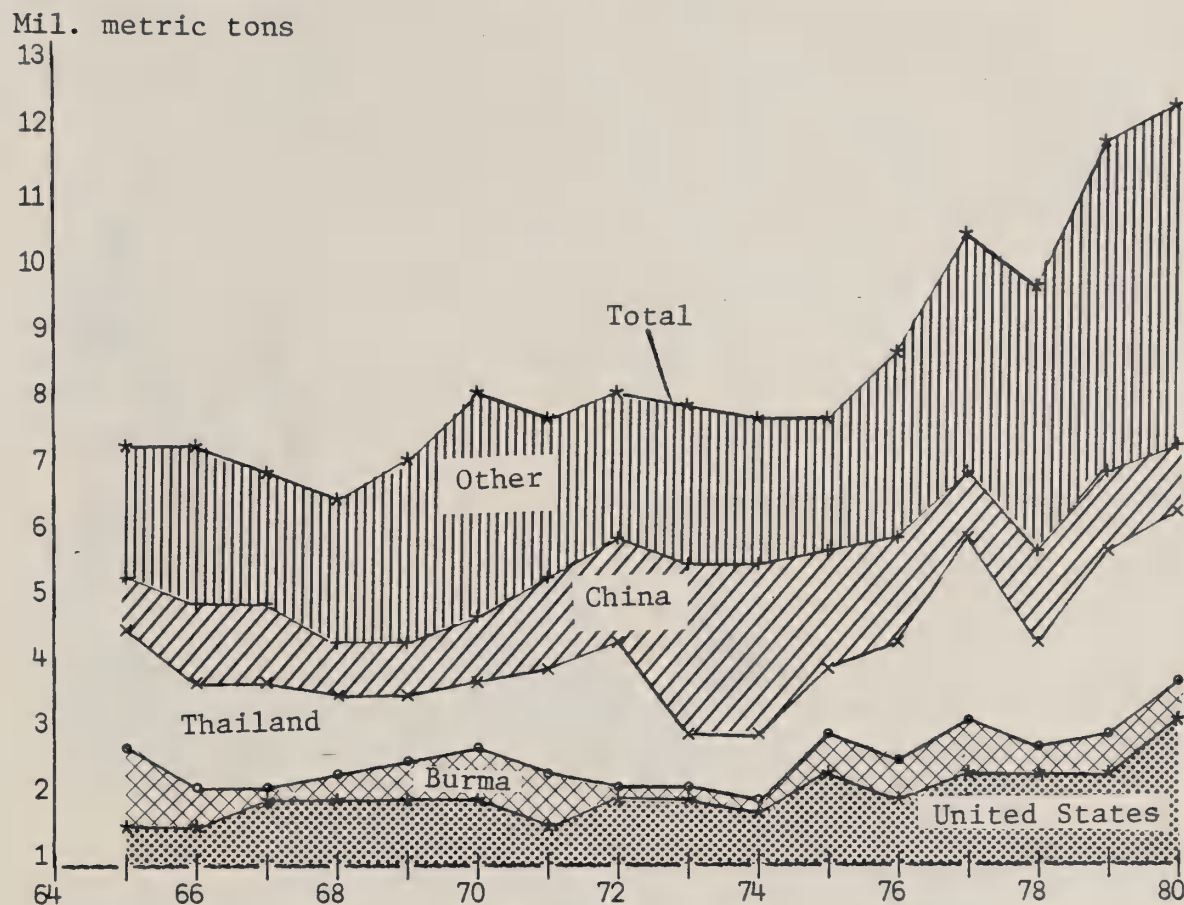
The world rice export market is dominated by a few countries (fig. 8). The United States, Thailand, and China accounted for 59 percent of the market from marketing year 1973/74 to 1977/78. Those three countries and Pakistan, Italy, and Burma account for about three-fourths of world rice exports.

Over 100 countries import rice, but less than 20 accounted for about one-half to two-thirds of the trade in the last 5 years (1974-78). Indonesia has been the foremost rice importer since 1968 (figure 9). That country imported between 1 and 2 million metric tons annually between 1973-78 with the exception of 1975. Other countries which had annual imports in excess of 300,000 metric tons at some time during the past 5 years include Bangladesh, Hong Kong, Iran, Malaysia (Peninsular), Sri Lanka, and the USSR.

Consumption

World consumption more than doubled between 1950-79, increasing from 114 to 257 million metric tons (milled basis). Consumption increased at a rate of 4.5 million metric tons per year since 1950.

Figure 8. World's Major Rice Exporting Countries

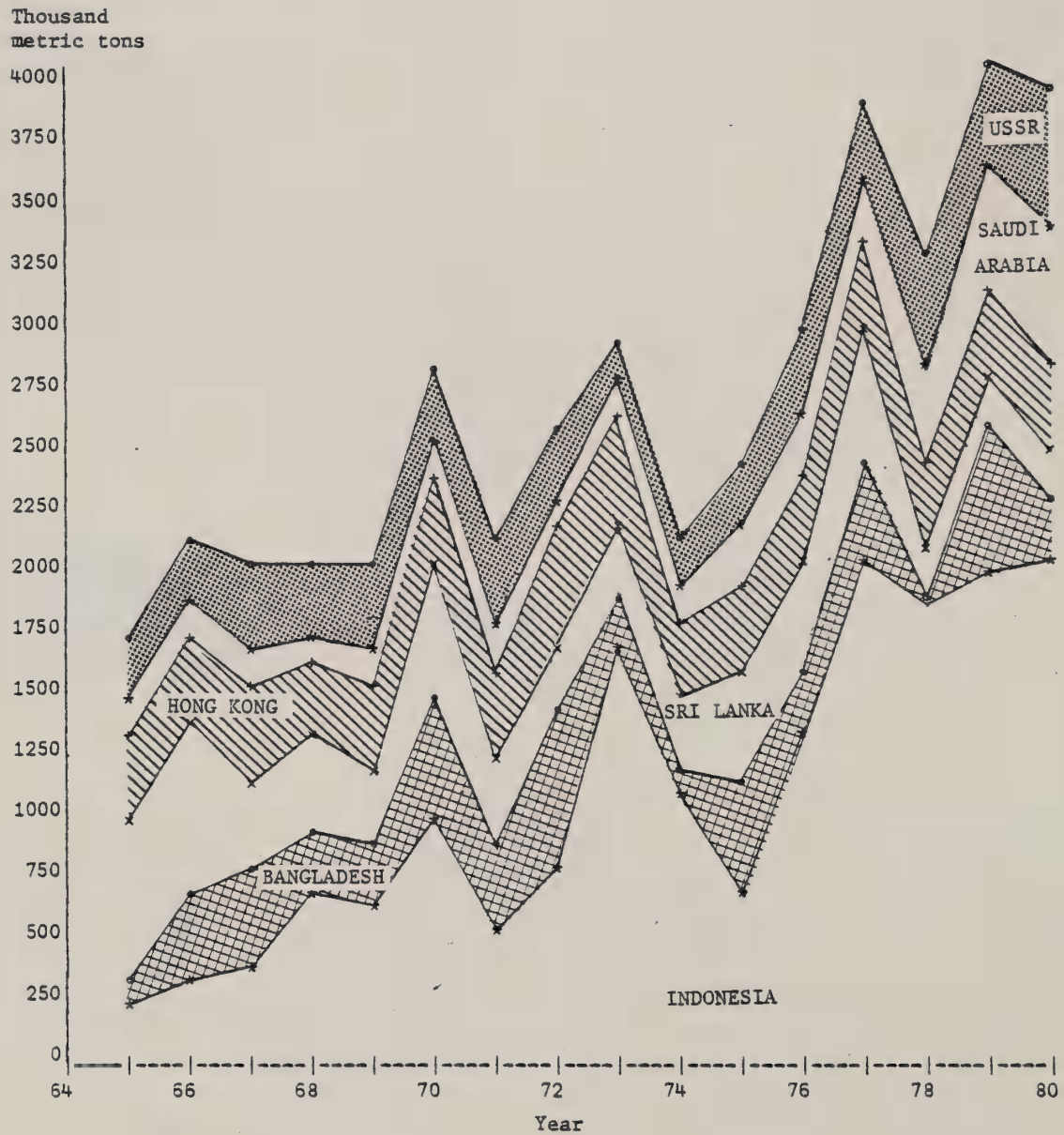


World per capita rice consumption increased from 46 kilograms (101 pounds) in 1950 to 60 kilograms (132 pounds) in 1978. The interruption of trade and production during World War II was rapidly overcome during the early fifties. Per capita consumption stabilized at about 53 kilograms (117 pounds) between 1955-66. Improved income in many rice-consuming countries has helped increase per capita consumption since 1966. Maintaining the 1977 world per capita consumption at 59 kilograms, given the current growth rate in population (1.88 percent per year), would require production of 383 million metric tons of rough rice in 1980, 5 percent above 1977 production.

RICE SITUATION AND OUTLOOK

The supply-use balance for U.S. rice will remain tight in 1980/81, because of smaller carry-in stocks and the worst drought in the history of the southern rice industry. Beginning stocks on August 1, 1980, totaled 25.7 million hundredweight, 19 percent less than last year's 31.6 million and the lowest carry-in since 1975/76. A record 3.3 million

Figure 9. World's Major Rice Importing Countries



acres are being harvested, and 1980 production is currently projected at 140 million hundredweight. The 12-percent increase in harvested acreage has offset reduced yields and boosted total production 3.5 million hundredweight above 1979. The U.S. average yield of 4,209 pounds per acre, indicated by conditions as of September 1, is the lowest since 1964. The projected 1980/81 supply of 166 million hundredweight is about 1-1/2 percent below last year's 168 million.

Record 1980 plantings of 3.4 million acres earlier indicated that rough rice prices could average lower than in 1979/80. But since the drought and heat have reduced crop prospects, and stocks are lower than earlier anticipated, the 1980/81 season average price for rough rice now appears likely to match last year's \$10.60 per hundredweight, probably falling within a range of \$10 to \$11.50. Prices during the first 5 months of the marketing year (August-December) are not expected to fall below the target price of \$9.49. Consequently, allotment holders will probably not be eligible for deficiency payments.

Exports in 1980/81 are currently projected at a record 87 million hundredweight, 2.5 million above 1979/80. Domestic use will continue to rise and is expected to total 50 million hundredweight, 3 million above last year. Given the current supply and demand outlook, ending stocks next August 1 are expected to total about 26 million hundredweight, virtually unchanged from this year. All of the carryover will be free stocks, since Commodity Credit Corporation is expected to ship its remaining inventory of about 2 million hundredweight under the Title II program of P.L. 480.

World rice production for 1980/81 is forecast at a record 392 million tons, 2 percent above the previous record in 1978/79. Major reasons are a timely summer monsoon and generally favorable weather in other principal producing countries. Despite the excellent world crop prospects, international rice trade in calendar 1981 is expected to be near 12.2 million tons, 300,000 tons below 1980's projected total. Current assessments of world production and trade point to no dramatic changes in 1980/81 world prices.

Five Year Outlook

The importance of rice as a world food crop will continue to grow as world population expands. The world's population reached 4 billion in 1975 and will pass 5 billion in the mid-1980's. Nearly 80 percent of the increase will occur in countries where rice is the staple food. Most of the world's rice is consumed in the country where it is produced. Only about 5 percent enters world trade channels.

The U.S. exports about 60 percent of its rice production, and has accounted for 20 to 30 percent of world rice trade in the past 10 years. As population pressure increases demand, world rice trade will be pushed higher. Calendar year world export rice trade averaged 7.8 million metric tons for the first 5 years of the past decade. It averaged 10.5 million metric tons for the last 5 years, 1975-79. The latter 2 years of that

5-year period averaged 11.6 million metric tons. World rice trade would average nearly 13 million metric tons for 1980-85, if it increases as much as 1975-79 did over 1970-74. Assuming that countries needing rice imports have the foreign exchange to pay for it, world rice trade levels could be in the 13 to 14 million metric ton range by the mid-1980's. There is, however, the possibility that national budgets strained by the impact of continually rising petroleum costs and higher costs for other imported goods could slow world rice trade expansion.

If world trade reaches these levels, it is estimated that U.S. rice exports will range between 3.5 and 4.0 million metric tons (77 to 88 million hundredweight) milled basis by 1985. If U.S. exports should reach this level, acreage planted would range between 3.5 to 4.0 million acres. Most of the increase in acreage could be expected to occur in the Mississippi River Delta of Arkansas, Mississippi, and Louisiana.

GOVERNMENT POLICY

Agricultural legislation applicable to rice dates from the early thirties with the enactment of the original Agricultural Adjustment Act (Public Law 10, 73rd Congress) of 1933. The basic agricultural legislation affecting the industry in 1979, however, had its origin in the Agricultural Adjustment Act of 1938 (Public Law 430, 75th Congress). Essentially, the 1938 Act endeavored to stabilize supplies through acreage adjustments, to store surplus rice under loans, and to regulate marketing quotas. A price-support program for rice was initiated in 1941. Pressure to meet domestic and world demand during and immediately after World War II was such that there was little Government involvement in the rice industry other than price support guarantees. It was 1948 before any loan activity or Government purchases occurred. In 1954, the season average price received by farmers fell 35 cents below support price and a significant quantity was delivered to the Commodity Credit Corporation (CCC). ^{8/} Deliveries reached over 25 million hundredweight in 1954 and 23 million hundredweight in 1955 (table 19). Acreage allotments and marketing quotas were instituted in 1955. The industry operated under a program, with modifications, designated to constrain production through 1975.

An announcement in October 1973 designated no market quotas for the 1974 crop because of short supplies. None were instituted for the 1975 crop. The 1976 crop then came under new legislation.

Congress changed the rice program from emphasis on supply control through marketing quotas and allotments to market control of supply

^{8/} The Commodity Credit Corporation (CCC) is a wholly owned Government corporation, created to stabilize, support, and protect farm income and prices; to assist in the maintenance of balanced and adequate supplies of agricultural commodities and their products, and to facilitate the orderly distribution of commodities. Management of the corporation is vested in a Board of Directors, subject to the general supervision and direction of the Secretary of Agriculture, who is an ex officio director and Chairman of the Board.

Table 19--National average rough-rice support price and related Commodity Credit Corporation (CCC) operation, 1950-79

Crop year 1/	National average support rate per cwt	Season average price per cwt received by farmers		Placed under price support				Deliv- ered to CCC	At crop year end July 31				Privately held (free) stocks	
		Actual	Above support	Loans	Purchase agreements	Total	CCC stocks and loan outstanding			Total				
							Stocks owned by CCC		Under loan		Total			
Dollars														
1950	4.56	5.09	0.53	217	575	792	26	378	4,519	17	395	4,124		
1951	5.00	4.82	-.18	4,008	1,843	5,851	518	226	2,040	1	227	1,813		
1952	5.04	5.87	.83	209	--	209	--	2	1,515	6	8	1,507		
1953	4.84	5.19	.35	1,808	2,666	4,474	3,170	917	7,546	283	1,200	6,346		
1954	4.92	4.57	-.35	17,552	12,923	30,475	25,141	15,586	26,700	2,589	18,445	8,255		
1955	4.66	4.81	.15	15,557	10,703	26,260	23,475	27,062	34,618	312	27,374	7,244		
1956	4.57	4.86	.29	13,304	10,423	23,727	16,771	12,507	20,103	48	12,555	7,548		
1957	4.72	5.11	.39	6,977	6,590	13,567	11,007	12,003	18,169	9	12,012	6,157		
1958	4.48	4.68	.20	8,306	3,280	11,586	6,575	9,421	15,669	34	9,455	6,214		
1959	4.38	4.59	.21	9,369	2,935	12,304	7,034	6,864	12,144	3	6,867	5,277		
1960	4.42	4.55	.13	7,825	5,280	13,105	4,876	4,124	10,080	8	4,132	5,948		
1961	4.71	5.14	.43	4,292	2,081	6,373	34	314	5,329	--	314	5,015		
1962	4.71	5.04	.33	5,602	6,622	12,224	1,841	1,852	7,730	1	1,860	5,870		
1963	4.71	5.01	.30	5,884	4,139	10,023	771	1,435	7,539	--	1,435	6,104		
1964	4.71	4.90	.19	7,629	99	7,728	787	1,041	7,677	3	1,044	6,633		
1965	4.50	4.93	.43	9,813	184	9,997	403	614	8,239	7	621	7,618		
1966	4.50	4.95	.45	14,362	5	14,367	119	140	8,511	92	232	8,279		
1967	4.55	4.97	.42	16,352	2	16,354	39	82	6,784	4	86	6,698		
1968	4.50	5.00	.40	23,640	640	24,280	6,320	6,087	16,210	238	6,325	9,885		
1969	4.72	4.95	.23	22,671	1,841	24,512	2,993	6,407	16,446	10	6,417	10,029		
1970	4.86	5.17	.31	20,787	733	21,520	3,528	9,329	18,634	138	9,467	9,167		
1971	5.07	5.34	.27	31,235	107	31,342	1,214	2,720	11,434	27	2,747	8,687		
1972	5.27	6.73	1.46	22,926	--	22,926	1	148	5,139	--	148	4,991		
1973	6.07	13.80	7.73	19,146	--	19,146	--	--	7,842	--	--	7,842		
1974	7.54	11.20	3.66	9,256	--	9,256	--	--	7,057	4	4	7,053		
1975	8.52	8.35	-.17	21,477	1,781	23,258	19,187	19,187	36,875	--	19,187	17,688		
1976	2/ 6.19	7.02	.83	23,425	608	24,033	8	18,610	40,501	111	18,721	21,780		
1977	2/ 6.19	9.49	3.30	19,557	--	19,557	--	10,772	27,398	--	10,772	16,626		
1978	2/ 6.40	8.16	2.40	27,117	--	27,117	--	8,143	31,618	--	8,143	23,475		
1979	2/ 6.79	10.16	3.81	25,867	--	25,867	--	1,891	25,672	--	1,871	23,871		

-- = None.

1/ Crop year August 1 to July 31.

2/ The target price was \$8.25 in 1976 and 1977, and \$8.53 in 1978, and \$9.05 in 1979.

Source: Rice Situation, Econ. and Stat. Serv., U.S. Dept. Agr.

with direct payments to allotment holders, based on the difference between August-December farm price and target price for 1976 and 1977 crops. The target price program, with minor modifications was extended in 1977 through the 1981 crop.

Price Support Program

Prior to the Rice Production Act of 1975, only producers with acreage allotments were eligible for price supports and when marketing quotas were in effect producers were subject to a severe penalty on production from acreage in excess of allotments. Allotment holders currently are permitted to plant acreage above their allotment, but they are eligible for loans only on allotment production. Non-allotment holders can also plant rice, but they are not eligible for any benefits. Eligible producers may receive price support on their allotment production from harvest time to March 31. Loans mature on April 30, but may be redeemed earlier by repaying the principal plus monthly interest charges. If the loan is not redeemed, the pledged rice is taken over by the Government and a delivery charge of 1 cent per hundredweight is made. Producers with allotments may sell their allotment rice to CCC, exclusive of any needed as loan collateral.

Allotments and Marketing Quotas

From 1955-75, the Secretary of Agriculture was required to announce a national rice-acreage allotment by the end of the year. The share for each producer (farm) was based on acreage of rice and allotments previously established. The share also depended on such other factors as abnormal conditions affecting acreage, availability of land, labor, equipment, crop rotation practices, and type of soil. The allotment provided a basis for establishing payments and loan eligibility and for limiting production. The benefits of the program went to the allotment owners (or in part to the growers leasing the allotment). They could be sold or leased with certain restrictions. Thus, they had a negotiable value.

If the total supply for a particular year exceeded normal supply during the 1955-75 period, the Secretary of Agriculture by December 31 proclaimed marketing quotas for the following year. A referendum was held within 30 days after the proclamation, and all producers who had a rice crop the preceding year were eligible to vote. Marketing quotas were instituted if approved by two-thirds of the farmers. These quotas were designed to induce compliance with allotted acreages. Producers who overplanted their allotted acreage were subject to a penalty on the excess rice produced. The penalty, in general, was equal to the farm's normal yield per acre times acres in excess of allotment. Actual yield was used to determine excess production if actual yield was less than normal. The penalty rate per pound of excess production was 65 percent of the June 15 parity price. Marketing quotas were suspended in 1974 and 1975, and the program was changed to the target price concept in 1976 and subsequent years. However, historical allotments were maintained as part of the program.

Rice allotments varied from a low of 1.65 million acres to a high of 2.4 million acres between 1955 and 1979. The five principal southern rice-growing

States account for 82 percent of the national allotment, and California for the most of the remainder.

Louisiana has the largest rice allotment, accounting for about 35 percent of the five principal southern States and nearly 29 percent of the national total. Texas and Arkansas have nearly equal allotments and combined account for nearly 61 percent of the allotments of the five principal southern rice-growing States and almost 50 percent of the national allotment.

Effects of Program Changes in the 1970's

The suspension of marketing quotas in 1974 and 1975 started the sharp increase in rice acreage and production. Harvested acreage at 2.2 million in 1973, with allotments and quotas, increased to 2.8 million in 1975 with allotments and suspended quotas. A large carryover in 1975 and prospects for low prices dampened the impact of shifting to a more market oriented policy in 1976. However, by 1979 harvested acreage had increased to 3.0 million and production to 139.6 million hundredweight. U.S. rice yields, peaking at 4,700 pounds in 1972, tapered off with the acreage increase. Some of the additional land was marginal for rice production. Established producers were stretching limited resources over a larger acreage. New growers were not familiar with producing rice. All of these factors contributed to a reduced yield.

Previous research had indicated that the Northeast Arkansas and Mississippi River Delta offered the greatest potential for expansion. The shift to less constraints on production and a market oriented policy led to a marked expansion in those areas relative to the other areas. During 1970-73, Arkansas and Mississippi had 24.3 and 2.8 percent of the U.S. harvested acreage, respectively (table 20). During 1976-79, these proportions had risen to 36.9 and 6.3, respectively. The other three States show about the same or slight increases in acreage harvested, but decline in their relative share. The shifts in acreage and production brought corresponding adjustments in drying, storage, and processing facilities with expansion of older facilities and construction of new ones.

The shift to the market-oriented policy has made the U.S. rice industry more dependent upon world supply and demand. U.S. production, increasing faster than domestic demand, created a need for expanding export markets. Export share of total U.S. disappearance increased from 59 percent in 1970-73 to 63 percent in 1976-79.

The expansion of U.S. rice exports and the change in price support emphasis resulted in a greater dependence on world rice price levels. The price support-acreage control program during 1955-73 stabilized prices above the world price level to the extent that very little price risk was involved for the U.S. rice industry. However, as world prices rose above U.S. support levels in 1973, risk re-entered the U.S. pricing structure. The change in U.S. rice policy in 1976 and subsequent crops left the cost of risk in the pricing structure. During the periods 1970-73 and 1976-78, the ratio of difference between the farm-mill prices to the farm price rose from 1.01 to 1.24. During basically the same period, the ratio of

Table 20--Share of U.S. harvested rice acreage

State	Period	
	1970/73	1976/79
	<u>Percent</u>	
Arkansas	24.3	36.9
California	18.3	16.4
Louisiana	28.7	20.1
Mississippi	2.8	6.3
Missouri	.3	.9
Texas	25.6	19.4
	<u>1,000 acres</u>	
U.S. acreage	1,905	2,687

difference between the mill-retail prices to the mill price rose from 1.10 to 1.32. ^{9/} The additional cost of risk is passed to the producer through a lower price received.

The shift to a market-oriented policy has generated a new interest for supply, demand, price and outlook information by all sectors of the rice industry.

^{9/} Bureau of Labor Statistics discontinued reporting retail rice prices as of July 1978. Not all of the ratio changes can be attributed to risk. Inflation would have some impact. The ratios were calculated as follows:

$$R = \frac{\Sigma PM - \Sigma PF}{\Sigma PF} \quad \text{or} \quad R = \frac{\Sigma PR - \Sigma PM}{\Sigma PM}$$

where

PF = Average price received by U.S. farmers, dollars per hundredweight

PM = U.S. No. 2 long grain, f.ob. mill, dollars per hundredweight

PR = Retail price, 38 cities, dollars per hundredweight

R = Ratio

Rice Program Costs

The Government has used various methods to maintain farm income, stabilize prices, ensure adequate supplies, reduce surpluses, and lower Government costs since enactment of the Agricultural Adjustment Act of 1933. Government costs were relatively small between 1950-54 (table 21). As surpluses accumulated in the midfifties, however, Government costs increased to \$264 million for fiscal year 1957. Program costs never fell below \$117 million per year during the sixties, and passed the \$200 million mark again in 1969. Costs climbed steadily for the next 5 years, reaching a record high of over \$345 million in 1974. Costs exceeded \$300 million from 1975 to 1977. However, they dropped to \$182 million in 1978. Total costs were \$4.6 billion from 1950-77. Over \$3 billion, or 78 percent, of the total rice program costs are accounted for by P.L. 480 shipments.

Subsidies were paid to exporters from 1958 to December 1972 when world prices were below domestic prices. The export subsidy program has cost over \$313 million since 1958. Payments under this program fell to \$2 million in 1968, then reached nearly \$25 million in 1972 before being discontinued the following year.

Current Program 10/

The Food and Agriculture Act of 1977 continued the dual target price and loan rate system, providing price and income support protection for rice producers through the 1981 crop year. Historical acreage allotments continue to apply.

Target Prices

Target prices for the 1978-81 rice crops will be adjusted on the basis of the 2-year moving average of variable, machinery ownership, and general farm overhead costs of rice production (table 22). This adjustment procedure is identical to the procedure adopted for wheat, feed grains, and upland cotton. However, the adjustment process was initiated with the 1978 rice crop, whereas the adjustment began with the 1979 crops for wheat and feed grains. In the Rice Production Act of 1975, target prices were adjusted for the change in the index of prices paid by farmers and were further adjusted for changes in the 3-year national average rice yield (moving average).

Price Support Loan Level

The loan level for each of the 1978-81 crops is to be established at a level which bears the same ratio to the prior year loan level that the current year's target price bears to the prior year target price. For instance, if the target price increased by 5 percent from 1 year to the next, then the loan rate would also increase by 5 percent. This adjustment

10/ Johnson, James and Milton H. Ericksen, Commodity Program Provisions Under the Food and Agriculture Act of 1977, CED, ERS, USDA, AER No. 389, Oct. 1977.

Table 21--Realized losses on Government programs affecting
the rice industry, 1950-78 1/

Fiscal year	Price support	Commodity export	Public Law 480	Other	Total
<u>Million dollars</u>					
1950	1.3	--	--	--	1.3
1951	<u>2/</u> .1	--	--	--	<u>2/</u> .1
1952	<u>2/</u> .1	--	--	--	<u>2/</u> .1
1953	.3	--	--	--	.3
1954	<u>2/</u> .6	--	--	--	<u>2/</u> .6
1955	<u>2/</u> 10.2	--	3.8	--	<u>2/</u> 6.4
1956	18.9	--	47.7	--	66.6
1957	65.4	--	198.8	--	264.2
1958	18.4	--	58.8	--	77.2
1959	31.5	4.5	35.5	--	71.5
1960	27.8	11.5	98.0	--	137.3
1961	32.1	18.6	109.8	--	160.5
1962	15.8	30.1	88.8	--	134.7
1963	12.4	24.1	123.4	--	159.9
1964	15.1	38.8	125.8	--	179.7
1965	13.2	38.4	103.3	--	154.9
1966	12.7	42.4	62.0	--	117.1
1967	10.0	22.0	143.9	--	175.9
1968	9.7	1.9	142.3	--	153.9
1969	11.2	3.2	187.3	--	201.7
1970	15.3	13.7	182.2	17.4	228.6
1971	17.1	17.8	175.8	26.5	237.2
1972	12.3	24.8	233.9	13.5	284.5
1973	16.2	21.8	259.4	14.5	311.9
1974	20.4	--	322.6	2.5	345.5
1975	4.6	--	291.9	20.2	316.7
1976 <u>3/</u>	13.8	--	257.5	32.4	303.7
1977	146.2	--	180.6	4.6	331.4
1978	2.8	--	162.5	16.6	181.9
Total	533.5	313.6	3,595.6	148.6	4,590.9

-- = Not available.

1/ The term "realized losses" refers to the costs incurred by the Commodity Credit Corporation in financing various farm programs. These data exclude administrative costs and receipts from Public Law 480 sales.

2/ Denotes a gain.

3/ Fiscal year changed from July 1-June 30 to October 1-September 30. 1976 includes July-September data also.

Source: Annual reports of the Commodity Credit Corporation.

Table 22--Target price adjustment procedure

-
1. Cost $I(t)$ = Variable costs $I(t)$ + machinery ownership costs $I(t)$ + general farm overhead costs $I(t)$

Where:

I = Commodity
 t = Crop year

2. Target price $I(t + 1)$ = Target price $I(t)$ +

$$\left[\frac{\text{Cost } I(t) + \text{cost } I(t - 1)}{2} - \frac{\text{cost } I(t - 1) + \text{cost } I(t - 2)}{2} \right]$$

Where:

Target price $I(t)$	= target price for the current year (t)
Target price $I(t + 1)$	= target price for the following year ($t + 1$)
Cost $I(t)$	= unit costs of commodity I in the current year (t)
Cost $I(t - 1)$	= unit costs of commodity I in year ($t - 1$)
Cost $I(t - 2)$	= unit costs of commodity I in year ($t - 2$)

procedure for rice loans is identical to that established in the 1975 Act. However, the legislation provides that the rice loan can be adjusted downward if the Secretary determines that the loan established by formula would discourage exports and result in excessive rice stocks. The rice loan may not be reduced below \$6.31 per hundredweight through the use of this provision.

National and Farm Allotments

The 1977 Act provides for a minimum national acreage allotment for rice of 1.8 million acres, which will be allocated to farms and producers in the same proportion as the 1975 farm allotments. These provisions are an extension of prior law. The 1980 allotment is set at 1.8 million acres.

Deficiency Payments and Loans and Purchases

Deficiency payments will be made to participants if the national average market price received by farmers during the first 5 months of the

marketing year for rice is below the target price. ^{11/} The payment rate is determined by the difference between the target price and the higher of the market price or the loan level.

The total amount of deficiency payments to program cooperators is determined by multiplying the payment rate times that portion of the allotment planted to rice times the yield established for the farm. ^{12/}

The total quantity of rice on which payments, if necessary, would be paid to a cooperator for any rice crop will be reduced by the quantity on which any disaster program payment (the disaster payment program is explained in a subsequent section) is made.

Maximum payment limits for rice producers were reduced from \$55,000 in 1977 to \$52,250 in 1978 and to \$50,000 in 1979. For both 1980 and 1981, the per person payment limitation is set at \$50,000 for wheat, feed grain, upland cotton, and rice programs combined. The combining of payment limitations across several crops should not have any appreciable impact on rice producers except possibly those in California and the Mississippi River Delta. Very little wheat, feed grain, and upland cotton are grown on rice farms except in those two areas (table 3). In 1979, only 21 percent of the cropland on rice farms in California was used to produce wheat, feed grain, and upland cotton. These crops were on 10 percent of the cropland on rice farms in the Mississippi River Delta.

Deficiency payments for rice of \$1.70 and \$.78 per hundredweight were made in 1976 and 1978, respectively. With the \$1.70 deficiency payment rate, an average U.S. rice producer in 1980 could grow about 652 acres of rice before reaching the payment limitation. At the \$.78 rate, producers could have about 1,421 acres of rice before exceeding the payment limitation. These acreage level estimates vary between individual producers due to the use of average yields for each individual. The average acres of rice on farms in four of the rice areas (California, both Texas areas, and Delta) indicate a number of the producers could be affected by the payment limitation if deficiency payments were at the 1976 level (table 3). However, in evaluating these averages from the 1979 cost of production survey, one must remember that (1) not all the rice acreage is eligible for Government programs, and (2) since there is a high degree of tenure operators, more than one individual usually is sharing the program benefits.

Set-Aside

The Secretary shall announce a set-aside if total rice supplies are determined to be excessive. The acreage of set-aside cannot exceed 39 percent of the farm acreage allotment. Any cropland set-aside must be devoted to approved

^{11/} A participant is a producer with an allotment who has set-aside any acreage required by a set-aside program.

^{12/} The farm payment yield in any one year will be based on the farm's actual yield per harvested acre for the 3 previous years and may be adjusted by the Secretary for abnormal conditions.

conservation uses. In addition, if a rice set-aside is in effect, the acreage normally planted to designated crops must also be reduced by the amount of the set-aside.

The legislation also authorizes the Secretary to make land diversion payments to rice producers who devote to approved conservation practices an acreage of cropland, whether or not a set-aside is in effect. No set-aside or paid diversion program was announced for the 1980 crop.

Disaster Payment Programs

Disaster payment programs were amended and extended through the 1980 rice crop. Both prevented planting and low-yield payments are provided for in the legislation. Disaster payment limitations were increased from \$50,000 to \$100,000 for the 1980 crop.

If all or a portion of a producer's acreage allotment cannot be planted to rice or other nonconserving crop because a natural disaster prevented planting, payments will be made to a program participant on the number of acres affected. The payment calculation will be $33\frac{1}{3}$ percent of the target price times the farm program yield.

With respect to low yields, rice producers beginning in 1978 will receive $33\frac{1}{3}$ percent of the target price on any loss of production below 75 percent of the yield established for the farm on their acreage planted for harvest within their allotted acreage.

Farmer Owned Reserve

The farmer owned reserve program provides an extended price support loan program. Reserve program loans are made for 36 months with an early redemption charge for prepaying before the release level is announced of not less than 140 percent of the loan rate. The release level is at 140 percent and the call level is at 160 percent of the loan rate. When the release level is reached, producers may (1) pay off the reserve loan and sell the rice, (2) leave the rice in the reserve, or (3) pay off the loan and hold the rice. When the call level is reached, producers have 30 days after the call to either redeem the reserve loan or forfeit the rice to the CCC. In 1979, an annual storage payment at \$.85 per hundredweight was made for rice in the reserve program. Interest is charged on the loan through the first year in which rice is in the reserve, but waived thereafter. Participation is limited to allotment holders on their allotment.

The reserve program isolates excess supplies from the market and helps to balance supply and demand and provide price strength when needed. However, in periods of low production it tends to place upper limits on market prices.

POLICY ISSUES FOR 1981 LEGISLATION

The current rice agricultural policy has evolved out of several programs designed to provide producers price and income support. Currently, the basic thrust is that of a market oriented policy. The nonrecourse loan and farmer held reserve programs are the first line of defense against the price depressing effects of rice supplies in excess of current requirements. Producers can place rice in the nonrecourse loan program to help overcome seasonal price depressions or in the farmer held reserve loan program if the price depression is longer than one season. Producers can sell rice held in the reserve program when crops and production are less favorable and prices higher (140 percent above the loan rate). In practice, a complete cycle of the reserve program has occurred. The set-aside and diversion programs are the second line of defense. The third line of defense, target prices, provides income safety that does not disturb operation of the market.

However, in the current rice program, not all segments are functioning in a manner consistent with the above objectives. Some of these problem areas will be policy issues for 1981 legislation.

Rice Reserve Program

Since rice became eligible for the long-term reserve program on April 4, 1977, only 140,000 hundredweight has been placed under contract (less than 1 percent of that eligible). The low amount in the reserve stocks may be related to the fact that the U.S. rice industry does not have a history of speculating with ownership of carryover stocks, as other U.S. grain industries. Large rice carryovers in the past were owned by the Government. This tradition of producers not owning carryover stocks may continue to dampen the impact of the rice reserve program. Prices received by U.S. rice farmers averaged \$8.00 per hundredweight in 1978-79, while the target price and loan rate were \$8.53 and \$6.40, respectively. However, very little rice moved into the reserve program that year. With the low price conditions in 1978-79, plus the added experience of speculating with carryover stocks, more rice might have moved into the reserve loan program.

The loan rate, a very critical factor in the reserve program, serves as a minimum price in the market. The release price serves as an upper price bounds if the reserve program functions properly. The release price is currently set at 140 percent of the loan rate. Increasing the release and call percentages widens the range at which domestic rice prices operate and limits the chances of moving surplus rice during periods of high prices. Under this condition, producers are less prone to place rice in the long-term reserve, since with a higher release percentage, their probability of selling the rice at some level above the loan rate is less. Decreasing the release and call percentages narrows the range at which domestic rice prices operate and increases the chances of moving surplus rice during periods of high prices. However, a low release and call percentage would make the reserve program less effective in controlling the upper price level. The level of the loan rate is important in that coupled with the release and call prices it sets the range at which U.S. rice prices fluctuate unless world

supplies are low enough to force prices even higher. If the loan rate is set too high, the U.S. would build large rice stocks that could not all be moved in periods when prices are high. This buildup could become burdensome on the U.S. Government and rice industry. On the other hand, if the loan rate is set too low, very little rice would move into the reserve program, rendering the program ineffective. Since very little rice is in the reserve program, the question of whether the current loan rate is too low is relevant in terms of a stimulus to moving rice into the program. However, the decision to place rice in the reserve program is also dependent upon the storage payment, and the risk of storing rice.

The current law stipulates that the loan rate will be adjusted by the same percentage adjustment as the target price. However, this annual adjustment does not allow the Secretary any upward adjustment. The Secretary has the authority to lower loan rates to a minimum of \$6.31 per hundredweight to keep U.S. rice competitive in world markets. However, to overcome the effects of a lower than necessary loan rate, upward flexibility may also be needed.

The surplus from the 1975-76 crop, owned by CCC, has served as a buffer for high prices. However, these stocks will soon be depleted with no rice reserves and no cushion for adverse supply years.

Set-Aside Diversion Program

The set-aside concept is designed to reduce the capacity of the entire agricultural plant rather than specific commodities and allow farmers the freedom to decide what to grow. However, the current set-aside diversion program, limited to allotment owners, would not be very effective in encouraging acreage reductions of rice. Rice allotments at 1.8 million acres were only 60 percent of the 1979 harvested acres. Rice allotments, established on a historical basis, are not uniformly distributed among current producers. The 1979 rice cost of production survey indicates only 40 percent of the rice planted in the Mississippi River Delta was covered with rice allotments. Southwest Louisiana producers had 96 percent of their rice acreage eligible for program benefits. The other areas fall between these two extremes. In the Delta, 41 percent of the 1979 crop was grown on farms without an allotment. These two conditions (only 60 percent of acreage covered and unequal distribution) would limit the expected response of the rice producers to any announced set-aside or acreage diversion programs.

The question of changing the historical rice allotment to a current planted acre basis as in the wheat, feed grain, and upland cotton programs will be of concern for the 1981 legislation. The "current planted acre" concept does overcome the two problems, a limited portion under allotment and an unequal distribution of the acreage covered. However, it would create a problem of how to equitably appease the producers holding the historical allotments. A large number of the producers who received the windfall gain from allotments with the 1955 crop are no longer producing. Many of the current allotment holders bought allotments directly, or indirectly with rice land, from these earlier producers. Shifting from a

historical allotment basis to a current year basis raises the problem of how to deal equitably with creating a windfall gain through program benefits to the new allotment holders on the one hand and taking away a value originally created the same way, but capitalized into the system over several decades.

Shifting from a historical allotment to a current year allotment also raises the question of whether to shift the target price level in order to maintain a low Government profile. Including all producers in the support base could be more expensive to the Government depending on the target price level.

Payment Limitation

The 1977 Act revised the payment limit for rice, wheat, feed grains, and upland cotton over a 3-year period to make the limits comparable. Payment limits for these crops in 1980 and 1981 combined will be at \$50,000. With inflation prevalent in the late 1970's, some pressure to raise this level may be exerted. No data are available on how many producers were affected by the payment limitation in 1976 or 1978.

Five-Month Market Price

Deficiency payments will be made to rice allotment holders on their allotment if the national weighted average market price received by farmers during the first 5 months of the marketing year (August to December) is below the established target price for that crop year. A problem lies in estimating the national weighted average market price. The 1979 rice cost of production survey indicated about 55 percent of the 1979 U.S. rice production was marketed by cooperatives. This varied by areas from 12 percent in Southwest Louisiana to 82 percent in California. Rice marketings by cooperatives are based on a pool concept. This creates a problem of establishing a producer market price for rice handled by the cooperatives prior to the time that their entire supply is sold. Payments to producers are usually made in installments at different periods throughout the year. Using a 5-month market price to compute the deficiency payment raises the issue of whether enough full sales have been made to properly establish a market price for deficiency payment purposes.

Rice usually is dried by producers before being sold or delivered to a cooperative. However, about 10 percent of the 1979 crop was sold as green rice with the buyer responsible for drying the rice. An issue related to this practice is how to handle green rice sales in determining the market price. Such an issue raises other questions, such as should adjustments be made to dry weight basis, and should drying costs also be an adjustment. The question is also applicable to the determination of target and loan price adjustments. Current practice for determining market price is to include green rice sales and adjust to a dry weight basis. No adjustment is made for the drying cost of the green rice. The current cost of production budgets used in adjusting target price and loan rate recognize green rice sales with a reduced drying cost for that portion sold green.

Rice in International Diplomacy

Rice, the daily staple for over half the world's population, has long been used in international diplomacy. For the United States, this has largely been P.L. 480 trade to support favored countries, such as South Korea and South Viet Nam. The current conflict with Iran, a major U.S. rice market, and the trade embargo on certain U.S. exports to Russia have impacted unexpectedly on the rice producer. Normal market operations were disrupted and prices fell.

The question arises as to the extent one segment of the economy should bear the brunt of a policy designed for the benefit of the country as a whole. Should commodity policy include a preplanned backup policy to go into effect if trade suspensions are used?

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GLOSSARY

Brewers rice--Those parts of a kernel which do not exceed one-quarter of the length of a kernel. The minimum limit varying with different grades of rice but which do not pass through a sieve with perforation of 1.4 mm.

Brokens--Pieces of rice kernels less than three-fourths of the length of whole grain.

Brown rice--Rice grain from which only the husk has been removed.

Commingled rice--Rice which has been blended together with other rice of similar type and grade.

Deficiency payment--A payment made to eligible producers when the 5-month national market price is less than the target price. The total payment to program cooperators is determined by multiplying the payment rate times that portion of the allotment planted to rice times the yield established for the farm.

Drying--Removal of kernel moisture to enhance safe storage conditions. Drying is usually achieved by forcing heated air through the grain mass.

Green rice--Rough rice where the excess moisture has not been removed.

Head rice--Whole grains of milled rice and broken kernels which are at least three-fourths length of unbroken kernels.

Head yield--Pounds of head rice milled from 100 pounds of rough rice.

Hulling--Process of removing husk from rough rice.

Loan rate--A price level established for providing minimum price support through nonrecourse loans.

Long grain rice--Rice that is long and slender in shape, measuring one-quarter of an inch or more in length. Kernel size of 6.5 mm or more in length and the length: width ratio ranging from 3.27 to 3.47:1.

Medium grain rice--Rice that is plump, measuring less than one-quarter of an inch in length. Kernel size ranging from 5.37 to 6.06 mm in length and having a length: width ratio from 2.09 to 2.49:1.

Milled rice--Rice grain from which husks, bran, and germ have been removed.

Milling--Processing rough rice into milled or brown rice.

Nonrecourse loan--Loans made by the Commodity Credit Corporation to eligible producers on the harvested crop that may or may not be redeemed, producer's option. If not redeemed, the CCC takes title to the commodity as full payment for the loan, including interest payment.

Parboiling--A process by which rough rice is steeped in water, steamed or heated to gelatinize starch, and subsequently dried.

Precooked rice--Milled rice which has been processed by various methods to make it quick cooking.

Processed rice--Rice used in breakfast cereals, soups, baby foods, package mixes, and similar uses.

Ratoon crop--Regrowth rice from the nodal buds of rice that had been harvested earlier.

Rough rice--The ripened ovary within a husk. Rice in the husk after threshing.

Screenings--Those parts of a kernel which are equal to or larger than one-quarter the length of a kernel, but less than one-half the length of a kernel.

Second heads--Those parts of a kernel which are equal to or greater than half the length of a kernel, but not equal to a whole kernel.

Short grain rice--Rice that is almost round in shape. Kernel size ranging from 4.56 to 5.01 mm in length, and the length: width ratio varying from 1.66 to 1.77:1.

Target price--A price level established as a basis for providing deficiency payments to allotment holders who participate in rice programs.

Total yield--Pounds of head, brewers, second heads and screenings milled from 100 pounds of rough rice.

Appendix table 1--Rice: Acreage, yield, production,
United States, 1965-80

Year	Acreage		Yield per harvested acre	Production
	Planted	Harvested		
	----- 1,000 acres -----		Pounds	1,000 cwt.
1965	1,804	1,793	4,255	76,281
1966	1,980	1,967	4,322	85,020
1967	1,982	1,970	4,537	89,379
1968	2,367	2,353	4,422	104,075
1969	2,141	2,128	4,268	90,838
1970	1,826	1,815	4,615	83,754
1971	1,826	1,818	4,638	85,768
1972	1,824	1,818	4,700	85,439
1973	2,181	2,170	4,274	92,765
1974	2,588	2,536	4,432	112,394
1975	2,818	2,802	4,555	127,624
1976	2,510	2,501	4,679	117,019
1977	2,261	2,249	4,412	99,223
1978	3,000	2,979	4,493	133,840
1979	3,000	2,979	4,588	136,667
1980 <u>1/</u>	3,360	3,330	4,209	140,175

Appendix table 2--Rice: Acreage, yield, production,
Missouri, 1965-80

Year	Acreage		Yield per harvested acre	Production
	Planted	Harvested		
	----- 1,000 acres -----		Pounds	1,000 cwt.
1965	4.8	4.3	4,930	212
1966	5.3	5.2	4,404	229
1967	5.2	5.1	4,608	235
1968	6.6	6.4	4,500	288
1969	5.6	5.4	4,593	248
1970	4.8	4.7	4,404	207
1971	5.0	4.9	4,796	235
1972	5.0	4.9	4,449	218
1973	5.3	5.2	4,346	226
1974	15.0	14.0	3,886	544
1975	18.0	18.0	4,210	758
1976	14.0	14.0	4,200	588
1977	17.0	17.0	3,700	629
1978	30.0	30.0	4,330	1,298
1979	35.0	35.0	3,810	1,333
1980 <u>1/</u>	45.0	45.0	4,000	1,800

1/ Preliminary.

Source: Economics and Statistics Service, USDA.

Appendix table 3--Rice: Acreage, yield, production,
Texas, 1965-80

Year	Acreage		Yield per harvested acre	Production
	Planted	Harvested		
	- - - - 1,000 acres - - - -		Pounds	1,000 cwt.
1965	464	462	4,600	21,252
1966	508	505	4,200	21,210
1967	510	508	5,000	25,400
1968	599	597	4,600	27,164
1969	550	548	3,950	21,646
1970	469	467	4,450	20,782
1971	470	468	5,100	23,868
1972	469	468	4,727	22,122
1973	553	549	3,740	20,530
1974	565	562	4,494	25,258
1975	555	548	4,560	24,996
1976	510	508	4,810	24,430
1977	502	501	4,670	23,400
1978	560	558	4,700	26,226
1979	560	557	4,220	23,481
1980 <u>1/</u>	590	588	4,000	23,520

Appendix table 4--Rice: Acreage, yield, production,
Arkansas, 1965-80

Year	Acreage		Yield per harvested acre	Production
	Planted	Harvested		
	- - - - 1,000 acres - - - -		Pounds	1,000 cwt.
1965	438	434	4,300	18,662
1966	482	477	4,300	20,511
1967	482	477	4,550	21,704
1968	578	572	4,350	24,882
1969	520	515	4,750	24,463
1970	442	438	4,800	21,024
1971	442	441	5,050	22,271
1972	442	441	4,975	21,939
1973	534	533	4,770	25,424
1974	750	725	4,535	32,879
1975	900	882	4,540	40,053
1976	850	847	4,770	40,362
1977	840	837	4,230	35,396
1978	1,180	1,090	4,450	48,505
1979	1,140	1,130	4,350	49,157
1980 <u>1/</u>	1,300	1,290	3,900	50,310

1/ Preliminary.

Source: Economics and Statistics Service, USDA.

Appendix table 5--Rice: Acreage, yield, production,
California, 1965-80

Year	Acreage		Yield per harvested acre	Production
	Planted	Harvested		
	- - - - 1,000 acres - - - -		Pounds	1,000 cwt.
1965	329	327	4,900	16,023
1966	362	360	5,500	19,800
1967	362	360	4,900	17,640
1968	434	432	5,325	23,004
1969	391	389	5,525	21,492
1970	333	331	5,700	18,867
1971	333	331	5,200	17,212
1972	333	331	5,614	18,583
1973	403	401	5,616	22,521
1974	470	467	5,380	25,110
1975	530	525	5,800	30,436
1976	421	420	5,570	23,388
1977	310	308	5,810	17,913
1978	500	499	5,260	26,248
1979	525	522	6,450	33,669
1980 <u>1/</u>	570	565	6,000	33,900

Appendix table 6--Rice: Acreage, yield, production,
Louisiana, 1965-80

Year	Acreage		Yield per harvested acre	Production
	Planted	Harvested		
	- - - - 1,000 acres - - - -		Pounds	1,000 cwt.
1965	517	515	3,550	18,282
1966	567	565	3,700	20,905
1967	567	565	3,900	22,035
1968	680	679	3,900	26,481
1969	613	611	3,400	20,774
1970	525	523	3,900	20,397
1971	524	522	3,800	19,836
1972	523	522	3,825	19,967
1973	624	620	3,451	21,394
1974	674	650	3,650	24,090
1975	652	658	3,810	25,064
1976	570	568	3,910	22,203
1977	480	475	3,670	17,445
1978	590	587	3,820	22,425
1979	530	528	3,910	20,643
1980 <u>1/</u>	615	607	3,500	21,245

1/ Preliminary.

Source: Economics and Statistics Service, USDA.

Appendix table 7--Rice: Acreage, yield, production,
Mississippi, 1965-80

Year	Acreage		Yield per harvested acre	Production
	Planted	Harvested		
	----- 1,000 acres -----		Pounds	1,000 cwt.
1965	51	50	3,700	1,850
1966	56	55	4,300	2,365
1967	56	55	4,300	2,365
1968	68	67	4,300	2,881
1969	61	60	4,200	2,520
1970	52	51	4,400	2,244
1971	52	51	4,600	2,346
1972	52	51	4,559	2,325
1973	62	62	4,306	2,670
1974	114	108	4,180	4,513
1975	175	171	3,900	6,665
1976	145	144	4,200	6,048
1977	112	111	4,000	4,440
1978	220	215	4,250	9,138
1979	210	207	4,050	8,384
1980 <u>1/</u>	240	235	4,000	9,400

1/ Preliminary.

Source: Economics and Statistics Service, USDA.

Appendix table 8--Rice: Production costs per planted acre and per hundredweight
by cost item, specified regions, revised 1977

Cost item	Arkansas (non-Delta)	Mississippi Delta	Gulf Coast	California	United States
			<u>Dollars</u>		
Costs per acre:					
Variable	170.73	169.12	190.96	205.94	183.67
Seed	20.57	16.68	20.08	20.07	19.72
Fertilizer	26.48	22.53	29.56	33.29	28.10
Chemicals	21.15	26.56	22.05	20.24	22.20
Custom operations	17.34	21.19	21.01	37.06	22.13
All labor	24.54	21.17	25.80	24.44	24.54
Fuel and lubrication	20.79	23.78	21.97	12.55	20.60
Repairs	11.45	10.42	12.99	13.88	12.27
Drying	23.54	22.78	20.12	24.79	22.18
Purchased irrigation water	.77	--	11.35	15.09	6.99
Miscellaneous	--	--	.85	--	.35
Interest	4.10	4.01	5.18	4.53	4.59
Machinery ownership	38.83	36.59	47.90	40.66	42.49
Replacement	25.94	24.27	32.86	27.94	28.82
Interest	9.99	9.52	11.75	9.51	10.58
Taxes and insurance	2.90	2.80	3.29	3.21	3.09
General farm overhead	7.79	7.79	7.04	15.28	8.51
Total of above	217.35	213.50	245.90	261.88	234.67
Costs per hundredweight					
Variable	3.94	4.23	4.62	3.57	4.17
Machinery ownership	.90	.92	1.16	.70	.97
Farm overhead	.18	.19	.17	.26	.19
Total of above	5.02	5.34	5.95	4.53	5.33
Yield per acre (hundredweight)	43.32	39.96	41.35	57.78	43.99
Percent of U.S. production	29.6	13.6	38.7	18.1	100.0

Appendix table 9--Rice: Production costs per planted acre and per hundredweight
by cost item, specified regions, 1978

Cost item	Arkansas (non-Delta)	Mississippi Delta	Gulf Coast	California	United States
	<u>Dollars</u>				
Costs per acre:					
Variable	183.81	184.09	199.57	218.91	195.31
Seed	27.43	26.41	21.46	31.01	25.69
Fertilizer	25.89	20.72	29.03	32.97	27.24
Chemicals	19.93	24.92	20.37	18.98	20.84
Custom operations	17.94	22.12	22.36	37.09	23.44
All labor	26.91	23.43	26.86	26.04	26.12
Fuel and lubrication	21.41	24.48	23.40	13.02	21.31
Repairs	12.41	11.33	14.04	15.09	13.24
Drying	26.30	25.89	24.47	23.97	25.18
Purchased irrigation water	.75	--	11.04	15.09	6.67
Miscellaneous	--	--	.82	--	.30
Interest	4.84	4.79	5.72	5.65	5.28
Machinery ownership	44.12	41.51	54.01	46.61	47.61
Replacement	28.17	26.39	35.57	30.38	30.86
Interest	12.68	11.96	14.74	12.60	13.28
Taxes and insurance	3.27	3.16	3.70	3.63	3.47
General farm overhead	8.40	8.40	7.62	16.47	9.45
Management	23.63	23.40	26.12	28.20	25.24
Total, excluding land	259.96	257.40	287.32	310.19	277.61
Land allocation					
Composite with					
Current value	72.88	56.60	64.33	116.31	73.98
Average acquisition value	59.40	37.80	57.39	83.21	58.67
Costs per hundredweight:					
Variable	4.13	4.33	4.74	4.22	4.39
Machinery ownership	.99	.98	1.29	.90	1.07
Farm overhead	.19	.20	.18	.32	.21
Management	.53	.55	.62	.54	.57
Total, excluding land	5.84	6.06	6.83	5.98	6.24
Land allocation					
Composite with					
Current value	1.64	1.33	1.53	2.24	1.66
Average acquisition value	1.33	.89	1.36	1.60	1.32
Total per hundredweight cost of production to a renter:					
Cost to share renter	7.67	8.25	8.58	8.03	8.18
Cost to cash renter	7.05	6.76	7.62	7.10	7.22
Weighted renter cost	7.53	7.48	8.33	7.90	7.92
Yield per acre (hundredweight)	44.55	42.45	42.09	51.88	44.49
Percent of U.S. production	29.4	17.4	34.0	19.2	100.0

Appendix table 10--Rice: Preliminary production costs per planted acre and per hundredweight by cost item, specified regions, 1979

Cost item	Arkansas (non-Delta)	Mississippi Delta	Gulf Coast	California	United States
Costs per acre:					
			<u>Dollars</u>		
Variable	197.71	200.23	225.71	239.90	215.13
Seed	22.23	21.41	21.99	29.23	23.03
Fertilizer	26.48	22.36	31.22	32.94	28.37
Chemicals	20.85	26.06	21.87	19.86	22.10
Custom operations	19.00	23.37	23.76	42.51	25.63
All labor	29.01	26.47	30.42	28.14	28.82
Fuel and lubrication	31.16	33.64	34.79	17.96	30.59
Repairs	13.74	12.54	15.70	16.71	14.68
Drying	28.52	28.43	24.62	29.61	27.36
Purchased irrigation water	.95	--	12.90	16.65	7.57
Miscellaneous	--	--	.78	--	.26
Interest	5.77	5.95	7.66	7.29	6.72
Machinery ownership	52.93	50.29	65.59	57.00	57.40
Replacement	31.18	29.20	39.64	33.63	34.08
Interest	17.89	17.36	21.55	19.09	19.23
Taxes and insurance	3.86	3.73	4.40	4.28	4.09
General farm overhead	9.44	9.44	8.51	18.51	10.71
Management	26.01	26.00	29.98	31.54	28.32
Total, excluding land	286.09	285.96	329.79	346.95	311.56
Land allocation					
Composite with					
Current value	90.30	72.98	76.54	171.89	96.33
Average acquisition value	71.72	48.08	67.69	124.35	74.69
Costs per hundredweight:					
Variable	4.54	4.86	5.60	3.74	4.72
Machinery ownership	1.22	1.22	1.63	.89	1.26
Farm overhead	.22	.23	.21	.29	.24
Management	.60	.63	.74	.49	.62
Total, excluding land	6.58	6.94	8.18	5.41	6.84
Land allocation					
Composite with					
Current value	2.08	1.77	1.90	2.68	2.12
Average acquisition value	1.65	1.17	1.68	1.94	1.64
Total per hundredweight cost of production to a renter:					
Cost to share renter	8.67	9.53	10.18	7.27	9.00
Cost to cash renter	7.85	7.71	9.44	6.38	8.25
Weighted renter cost	8.48	8.58	9.99	7.14	8.80
Yield per acre (hundredweight)	43.51	41.20	40.30	64.10	45.54
Percent of U.S. production	26.6	18.6	30.1	24.6	100.0

Appendix figure 1--Official U.S. rice designations

Classes	Rough	Brown	Milled	Broken
Sub-classes	Long Medium Short Mixed	Long Medium Short Mixed	Long Medium Short Mixed	Second Heads Screenings Brewers
Grades	Special ●Parboiled ●Smutty ●Weevily U.S. Number ●1 ●2 ●3 ●4 ●5 ●6 ●Sample	Special ●Parboiled ●Smutty U.S. Number ●1 ●2 ●3 ●4 ●5 ●Sample	Special ●Parboiled ●Coated ●Undermilled ●Granulated Brewers U.S. Number ●1 ●2 ●3 ●4 ●5 ●6 ●Sample	U.S. Number ●1 ●2 ●3 ●4 ●5 ●Sample

[illegible]

Appendix table 12--World rice area, by region

[illegible]

Source: Foreign Agriculture Circular, For. Agr. Serv., U.S. Dept. Agr., various issues.

Appendix table 13--Commercial rice dryers: Number and capacity, by size group and area, 1979 1/

Area	Capacity size group (1000 cwt.)										Total
	Under 200	200- 399	400- 599	600- 799	800- 1000	Over 1000					
	Number										
Total all areas	53	88	34	31	10	47					263
Grand Prairie Arkansas	1	6	--	2	--	8					17
Northeast Arkansas	3	7	4	1	1	8					24
Mississippi River Delta	11	20	9	4	3	7					54
Southwest Louisiana	11	23	4	5	1	1					45
Gulf Coast, Texas	23	22	13	15	2	9					84
California	4	10	4	4	3	14					39
	Capacity (1,000 cwt.)										
Total all areas	6,306	24,813	15,997	21,302	8,897	89,645					166,960
Grand Prairie Arkansas	141	1,684	--	1,453	--	19,510					22,788
Northeast Arkansas	288	1,986	2,060	747	825	17,897					23,803
Mississippi River Delta	1,198	5,810	4,150	2,689	2,919	11,080					27,846
Southwest Louisiana	1,309	6,101	1,676	3,303	833	1,582					14,804
Gulf Coast, Texas	2,708	6,244	6,342	10,403	1,649	16,304					43,650
California	662	2,988	1,769	2,707	2,671	23,272					34,069

-- = zero.

1/ Based on firms having uniform rice storage agreements as determined from Agricultural Stabilization and Conservation Service records.

Appendix table 14-Commercial rice dryers: Number and capacity
1965, 1973, 1979 1/

State	Dryers by capacity size			
	Under 180	180-540	Over 540	Total
	<u>1,000 cwt.</u>			
Five-State total:				
<u>2/</u>				
1965	110	77	24	211
1973	59	104	56	219
1979	46	117	96	263
Arkansas:				
1965	20	24	13	57
1973	7	31	21	59
1979	6	31	32	<u>3/</u> 69
California:				
1965	8	7	4	19
1973	8	12	11	31
1979	2	16	21	39
Louisiana:				
1965	34	20	3	57
1973	12	30	8	50
1979	14	34	11	59
Mississippi:				
1965	6	1	0	7
1973	5	4	1	10
1979	4	6	2	12
Texas:				
1965	42	25	4	71
1973	26	28	15	69
1979	21	33	30	84

1/ Based on firms having uniform rice storage agreements as determined from Agricultural Stabilization and Conservation Service records.

2/ These five States accounted for 99.8 percent of U.S. production in 1973.

3/ Includes 4 dryers in Missouri.

Appendix table 15--Commercial rice dryers, storage capacity, and share of capacity, by type of ownership, 1979 ^{1/}

Area	Ownership		Storage capacity		Share of storage capacity	
	Corporation	Cooperative	Corporation	Cooperative	Corporation	Cooperative
	Number		- 1,000 cwt.		Percent	
Total all areas	187	76	91,927	75,033	55	45
Grand Prairie Arkansas	9	8	5,053	17,735	22	78
Northeast Arkansas	9	15	4,308	19,495	18	82
Mississippi River Delta	33	21	14,445	13,401	52	48
Southwest Louisiana	36	9	12,502	2,302	84	16
Gulf Coast, Texas	73	11	36,257	7,393	83	17
California	27	12	19,362	14,707	57	43

^{1/} Based on firms having uniform rice storage agreements as determined from Agricultural Stabilization and Conservation Service records, Kansas City commodity office, Shawnee Mission, Kansas.

Appendix table 16--Comparison of seasonal average rough-rice price, target price, and support price received by producers, United States, by specified crop year

Crop year <u>1/</u>	Price		Average rough rice price		Price difference	
	Support	Target	Seasonal	August- December	Seasonal average minus support	August- December minus target
<u>Dollars per cwt.</u>						
1950	4.56	--	5.09	--	0.53	--
1951	5.00	--	4.82	--	-.18	--
1952	5.04	--	5.87	--	.83	--
1953	4.84	--	5.19	--	.35	--
1954	4.92	--	4.57	--	-.35	--
1955	4.66	--	4.81	--	.15	--
1956	4.57	--	4.86	--	.29	--
1957	4.72	--	5.11	--	.39	--
1958	4.48	--	4.68	--	.20	--
1959	4.38	--	4.59	--	.21	--
1960	4.42	--	4.55	--	.13	--
1961	4.71	--	5.14	--	.43	--
1962	4.71	--	5.04	--	.33	--
1963	4.71	--	5.01	--	.30	--
1964	4.71	--	4.90	--	.19	--
1965	4.50	--	4.93	--	.43	--
1966	4.50	--	4.95	--	.45	--
1967	4.55	--	4.97	--	.42	--
1968	4.60	--	5.00	--	.40	--
1969	4.72	--	4.95	--	.23	--
1970	4.86	--	5.17	--	.31	--
1971	5.07	--	5.34	--	.27	--
1972	5.27	--	6.73	--	1.46	--
1973	6.07	--	13.80	--	7.73	--
1974	7.54	--	11.20	--	3.66	--
1975	8.52	--	8.35	--	-.17	--
1976	6.19	8.25	7.02	6.55	.83	-1.70
1977	6.19	8.25	9.49	9.08	3.30	.83
1978	6.40	8.53	8.16	7.75	1.76	-.78
1979	6.79	9.05	10.60	9.87	3.81	.82
1980	7.12	9.49	--	--	--	--

1/ Crop year August 1 to July 31.

Source: Rice Situation, Econ. and Stat. Serv., U.S. Dept. Agr.

— = Prices not available.

Sources: Rice Situation, Econ., and Stat. Serv., and For. Agr. Serv., U.S. Dept. Agr.

1/ Crop year August 1 to July 31.
2/ Retail price quotations were discontinued for rice as of July 1978.

Source: Rice Situation, Econ. and Stat. Serv., U.S. Dept. Agr.

Appendix table 19-Supply and disappearance of U.S. rough rice, 1960-80 1/

Crop year 2/	Supply										Disappearance										Statistical discrepancy (July 31)
	Beginning stocks	Production	Imports	Total ports	Domestic Use					Industry	Seed domestic use	Exports 3/	Total disappearance 4/	Statistical discrepancy							
					Food	Civilian consumption	Military procurement	Shipments to territories	Total												
Million cwt.																					
1960	12.1	54.6	3	67.0	15.7	2	4.0	19.9	4.9	2.1	26.9	29.5	56.4	.5	10.1						
1961	10.1	54.2	4	64.7	18.8	2	3.6	22.6	4.7	2.3	29.6	29.2	58.7	.6	5.3						
1962	5.3	66.0	5	71.4	17.1	2	4.2	21.5	4.1	2.4	27.9	35.5	63.5	.2	7.7						
1963	7.7	70.3	5	78.0	18.4	2	3.9	22.5	3.8	2.5	28.8	41.8	70.6	-1	7.5						
1964	7.5	73.2	5	81.2	20.2	2	3.9	24.3	4.3	2.5	31.1	42.5	73.6	-1	7.7						
1965	7.7	76.3	7	84.6	19.5	1	3.8	23.4	4.7	2.7	30.8	43.3	74.2	2.2	8.2						
1966	8.2	85.0	5	93.3	20.0	1	3.8	24.0	5.3	2.7	31.9	51.6	83.5	1.2	8.5						
1967	8.5	89.4	5	97.9	21.2	1	3.6	25.0	5.4	3.2	33.7	56.9	90.6	.6	6.8						
1968	6.8	104.1	5	110.9	22.5	2	4.3	27.0	5.8	2.9	35.6	56.1	91.7	3.0	16.2						
1969	16.2	91.9	2	108.3	18.6	3	4.6	23.5	7.1	2.5	33.1	56.9	90.0	3.0	16.4						
1970	16.4	83.8	1.4	101.7	21.2	3	3.6	25.1	6.8	2.5	34.4	46.5	80.9	2.1	18.6						
1971	18.6	85.8	1.1	105.5	19.8	3	5.4	25.5	7.4	2.5	35.4	56.9	92.3	1.8	11.4						
1972	11.4	85.4	5	97.4	19.9	2	5.0	25.1	7.7	3.0	35.7	54.0	89.8	2.5	5.1						
1973	5.1	92.8	2	98.1	22.0	2	3.8	26.1	8.1	3.6	37.8	49.7	87.5	2.7	7.8						
1974	7.8	112.4	5	120.3	22.4	2	6.0	28.6	8.4	4.0	41.0	69.3	110.5	2.7	7.1						
1975	7.1	128.4	5	135.5	21.6	2	5.9	27.7	9.1	3.5	40.3	56.5	96.8	1.8	36.9						
1976	36.9	115.6	1	152.6	22.6	2	6.4	29.2	10.3	3.2	42.7	65.6	108.3	3.8	40.5						
1977	40.5	99.2	1	139.8	17.7	2	5.6	23.5	9.9	4.3	37.7	72.8	110.5	1.9	27.4						
1978	27.4	133.2	1	160.6	28.3	3	4.0	32.6	11.1	4.3	48.0	76.9	124.9	4.7	31.6						
1979	31.6	136.7	1	168.4	27.1	3	3.6	31.0	11.1	4.8	46.9	84.5	131.4	11.3	25.7						
1980	25.7	140.2	--	165.9	--	--	--	--	--	--	50.0	87.0	137.0	3.0	25.9						

1/ Consolidated supply and disappearance of rough and milled rice. Converted milled rice data to a rough rice basis using annually derived extraction rates and factors. 2/ Crop year August-July 31. 3/ Based on Bureau of Census reports. Estimates for 1968, 1969, and 1970 adjusted by ASCS data, based on bills of lading submitted to the USDA for export payment. 4/ Results from storage and handling losses, and inaccurate data on rough rice feed use estimate that was abandoned beginning in 1960. 5/ Less than 50,000 cwt.

Source: Rice Situation, Econ. and Stat. Serv., U.S. Dept. Agr.

Appendix table 20--U.S. exports of milled rice, by type of product, 1966-78

Crop year <u>1/</u>	Brown	Relief milled	Parboiled	Regular milled <u>2/</u>	Total
<u>Million cwt.</u>					
1966	4.8	<u>3/</u>	3.2	29.7	37.7
1967	11.2	.2	3.2	26.8	41.4
1968	15.7	.4	5.9	17.7	39.7
1969	8.7	.1	8.3	22.2	39.3
1970	13.8	<u>3/</u>	5.8	13.9	33.6
1971	14.6	.4	6.8	19.8	41.6
1972	12.3	.1	6.6	20.4	39.4
1973	4.1	.3	7.8	23.6	35.8
1974	13.5	<u>3/</u>	5.3	30.8	49.7
1975	11.4	<u>3/</u>	9.0	19.4	39.8
1976	8.2	.1	10.4	27.9	46.6
1977	5.8	.7	11.1	30.2	47.8
1978	10.1	.2	7.5	24.1	41.9
Average	10.3	.2	7.0	23.6	41.1
<u>Percent</u>					
1966	12.7	<u>3/</u>	8.5	78.8	100
1967	27.0	.6	7.7	64.7	100
1968	39.5	1.0	14.9	44.6	100
1969	22.4	<u>3/</u>	21.1	56.5	100
1970	41.1	.2	17.3	41.4	100
1971	35.1	1.0	16.3	47.6	100
1972	31.2	.2	16.8	51.8	100
1973	11.5	.8	21.8	65.9	100
1974	27.2	.1	10.7	62.0	100
1975	28.6	<u>3/</u>	22.6	48.8	100
1976	17.6	.2	22.3	59.9	100
1977	12.1	1.5	23.2	63.2	100
1978	24.1	.5	17.9	57.5	100
Average	25.1	.5	17.0	57.4	100

1/ Crop year August 1 to July 31.2/ Includes brokens and unclassified.3/ Less than 100,000 cwt. or 0.1 of 1.0%.Source: Rice Market News, Agr. Mktg. Serv., U.S. Dept. Agr.

Appendix Table 21--Rice acreage allotments, by State, 1955-79

Crop year	Southern States					California	Minor States	Unap- portioned	U.S. total 1/	
	Missouri	Missis- sippi	Arkansas	Louisiana	Texas					
						Total 1/				
						1,000 acres				
1955	4.2	48.4	448.6	557.4	496.2	1,554.8	350.2	4.9	18.4	1,928.3
1956	4.6	46.7	399.1	475.1	422.4	1,347.9	299.8	4.7	.2	1,652.6
1957	4.6	46.7	398.9	474.9	422.2	1,347.3	299.7	4.6	1.0	1,652.6
1958	4.8	46.7	399.0	475.0	422.3	1,347.8	299.8	4.7	.3	1,652.6
1959	4.8	46.7	398.9	474.9	422.1	1,347.4	299.6	4.7	.9	1,652.6
1960	4.8	46.7	399.0	475.0	422.3	1,347.8	299.8	4.8	.3	1,652.6
1961	4.8	46.7	399.0	475.0	422.3	1,347.8	299.8	4.8	.3	1,652.6
1962	5.2	51.3	438.9	522.5	464.6	1,482.5	329.7	5.2	.3	1,817.9
1963	5.2	51.4	439.0	522.6	464.7	1,482.9	329.8	5.2	.2	1,818.2
1964	5.2	51.4	439.0	522.6	464.7	1,482.9	329.8	5.2	.2	1,818.2
1965	5.2	51.4	439.0	522.6	464.7	1,482.9	329.8	5.2	.7	1,818.6
1966	5.8	56.5	482.9	574.9	511.1	1,631.2	362.8	5.8	.7	2,000.5
1967	5.8	56.5	482.9	574.9	511.1	1,631.2	362.8	5.8	.7	2,000.5
1968	6.9	67.8	579.5	689.9	613.3	1,957.4	435.4	6.9	.9	2,400.6
1969	6.2	61.0	521.6	620.0	552.0	1,761.7	391.8	6.2	.8	2,160.5
1970	5.3	51.9	443.3	527.8	469.2	1,497.4	333.0	5.3	.7	1,836.5
1971	5.3	51.9	443.3	527.8	469.2	1,497.4	333.0	5.3	.7	1,836.5
1972	5.3	51.9	443.3	527.8	469.2	1,497.4	333.0	5.3	.7	1,836.5
1973	6.4	62.7	536.4	638.6	567.7	1,811.9	403.0	6.4	.8	2,222.1
1974	6.0	59.3	507.0	603.6	536.6	1,712.6	380.9	6.0	.4	2,100.0
1975	5.2	50.9	435.3	518.2	460.7	1,470.4	327.0	5.2	.3	1,802.9
1976	5.2	50.8	434.6	517.8	460.2	1,468.6	326.6	4.8	0	1,800.0
1977	5.2	50.8	434.6	517.8	460.2	1,468.6	326.6	4.8	0	1,800.0
1978	5.0	50.8	434.9	517.9	460.3	1,468.9	326.5	4.5	.1	1,800.0
1979	5.0	50.8	435.1	517.8	460.4	1,469.1	326.6	4.2	.1	1,800.0

1/ Totals may not add because of rounding.

Source: Data for 1955-59, Food Grain Statistics Through 1967, SB-423; 1960-67, Rice Situation, RS-12; 1968-69, Rice Situation, RS-15; 1970-75, Rice Situation, RS-25; and 1976-79, Rice Situation, RS-33, Econ., Stat., and Coop. Serv., U.S. Dept. Agr.



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